

# EMC TEST REPORT

**Report No.** : TS08050107-EME  
**Model No.** : XN-721AI, XN-721  
**Issued Date** : Jun. 05, 2008

**Applicant:** Z-Com, Inc.  
7F-2, No. 9. Prosperity RD. I Science-Based Industrial  
Park, Hsinchu, 300 Taiwan

**Test Method/  
Standard:** CFR 47 FCC Part 15.247

**Test By:** Intertek Testing Services Taiwan Ltd.  
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,  
Shiang-Shan District, Hsinchu City, Taiwan

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Report Engineer



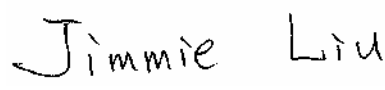
Sunny Liu

Project Engineer



Rex Liao

Reviewed By



Jimmie Liu

## Table of Contents

1. Summary of Test Data.....	3
2. General Information .....	4
3. Maximum 6dB Bandwidth .....	8
4. 99% Occupied Bandwidth.....	15
5. Maximum Output Power.....	22
6. Power Spectral Density .....	24
7. RF Antenna conducted Spurious.....	32
8. Radiated Spurious Emission .....	51
9. Emission on Band Edge.....	59
Appendix A: 2.1046 - RF Power Output .....	82
Appendix B: 2.1049 - Occupied Bandwidth .....	83
Appendix C: 2.1051 - Spurious Emission at Antenna Terminal.....	84
Appendix D: 2.1053 – Field Strength of Spurious Radiation.....	85
Appendix E: 15.207 – AC power line conducted emission .....	87
Appendix F: Test Equipment List.....	89

## 1. Summary of Test Data

Test/Requirement Description	Applicable Rule	Result
Minimum 6dB Bandwidth	15.247(a)(2)	Pass
Maximum Output Power	15.247(b)	Pass
Power Spectral Density	15.247(e)	Pass
RF Antenna Conducted Spurious	15.247(d)	Pass
Radiated Spurious Emission	15.247(d), 15.205, 15.209	Pass
Emission on the Band Edge	15.247(d)	Pass
AC Power Line Conducted Emission	15.207	Pass

## 2. General Information

### Identification of the EUT

Applicant:	Z-Com, Inc.
Product:	802.11b/g/n Wireless LAN USB Adapter
Model No.:	XN-721AI
FCC ID.:	M4Y-XN721V01
Frequency Range:	1. 2412MHz to 2462MHz for 802.11b/g/n HT20 2. 2422MHz to 2452MHz for 802.11n HT40
Channel Number:	1. 11 Channels for 802.11b/g/n HT20 2. 7 Channels for 802.11n HT40
Rated Power:	DC 5V from Notebook PC
Power Cord:	N/A
Sample Received:	May 22, 2008
Test Date(s):	May 22, 2008 ~ May 29, 2008
Note 1:	This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

## Description of EUT

The EUT is an 802.11b/g/n Wireless LAN USB Adapter, it has one transmission and two receiver functions, and was defined as information technology equipment.

The customer confirmed the model listed as below is series model to model XN-721AI (EUT), the difference between main model and series model are listed as below.

Model Number	Different
XN-721AI	with one Flash and auto install version
XN-721	Without Flash

For more detail features, please refer to User's manual as file name "Installation guide.pdf"

## Antenna description

### For Tx antenna

The EUT uses a permanently connected antenna.

Antenna Gain: 1.02dBi max  
Antenna Type: PCB antenna  
Connector Type: N/A

**Operation mode**

The EUT was transmitted continuously during the test.

With individual verifying, the maximum output power was found out 1Mbps data rate for 802.11b mode, 6Mbps data rate for 802.11g mode, 6.5Mbps data rate for 802.11n HT20, 13.5Mbps data rate for 802.11n HT40. The final tests were executed under these conditions and recorded in this report individually. Please refer to following table.

802.11b ch6	
Data rate	PK(dBm)
1M	20.12
2M	19.84
5.5M	19.64
11M	19.55

802.11g ch6	
Data rate	PK(dBm)
6M	24.48
9M	24.37
12M	24.18
18M	24.02
24M	23.89
36M	23.85
48M	23.77
54M	23.59

802.11n(HT20) ch6	
Data rate	PK(dBm)
6.5M	24.09
13M	23.91
19.5M	23.82
26M	23.8
39M	23.72
52M	23.64
58.5M	23.49
65M	23.33

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802.11(HT40) ch6	
Data rate	PK(dBm)
13.5M	22.86
27M	22.51
40.5M	22.07
54M	21.92
81M	21.86
108M	21.73
121.5M	21.66
135M	21.52

### 3. Maximum 6dB Bandwidth

<b>Name of Test</b>	Maximum 6dB Bandwidth
<b>Base Standard</b>	FCC 15.247 (a)(2)

**Tested By:** Rex Liao  
**Test Date:** May 29, 2008

**Test Equipment:** EC1365

**Test Result:** Complies  
**Test Method:** See Appendix B  
**Measurement Data:** See Table & plots below

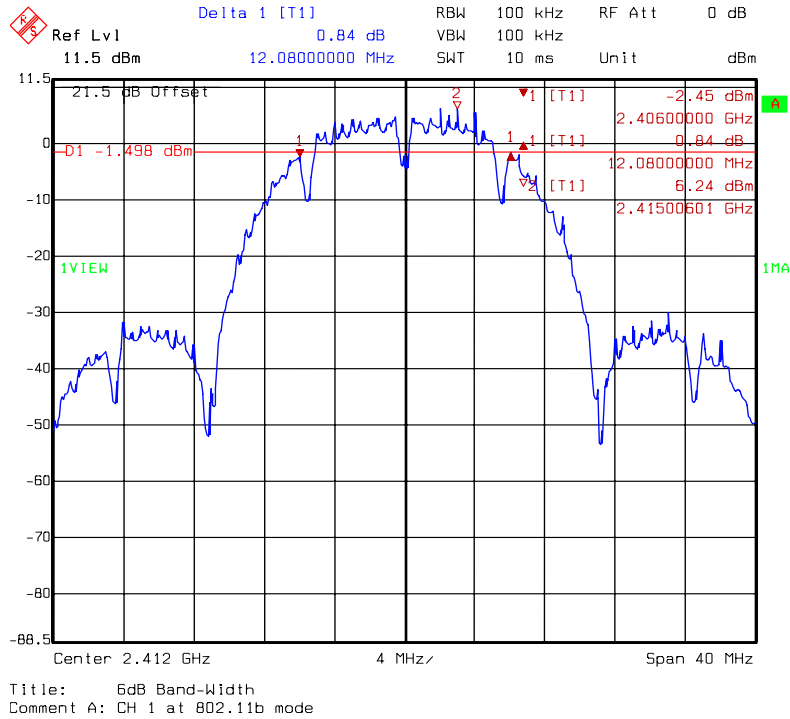
**Note:** The EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle and high channel.

Table1. Maximum 6dB Bandwidth

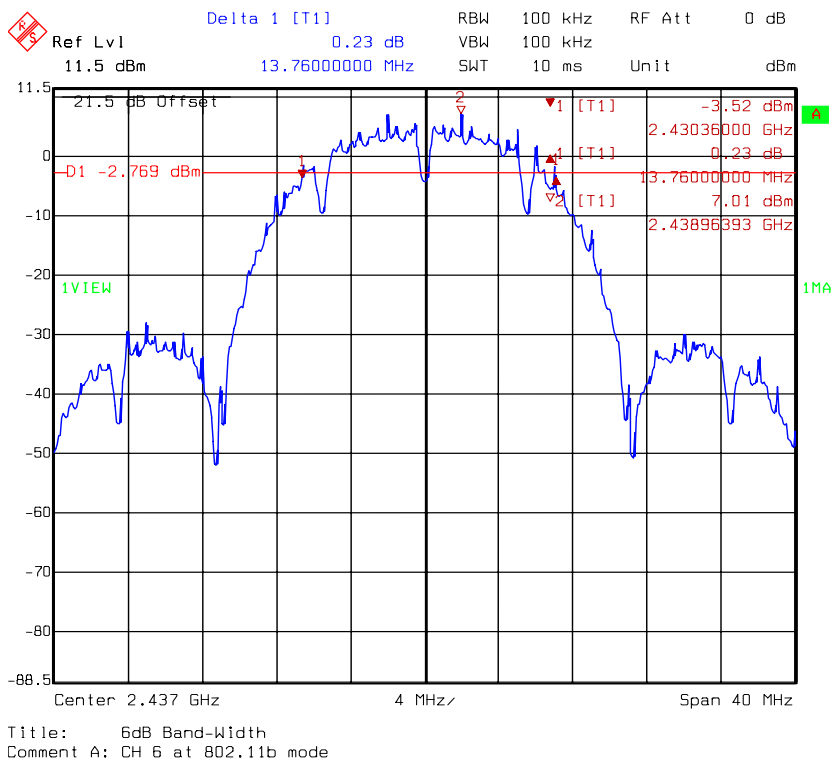
Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (MHz)	Pass/Fail
11b	1	2412	12.08	0.5	Pass
	6	2437	13.76	0.5	Pass
	11	2462	14.08	0.5	Pass
11g	1	2412	16.32	0.5	Pass
	6	2437	16.48	0.5	Pass
	11	2462	16.64	0.5	Pass
HT20	1	2412	17.76	0.5	Pass
	6	2437	17.76	0.5	Pass
	11	2462	17.84	0.5	Pass
HT40	3	2422	33.90	0.5	Pass
	6	2437	33.90	0.5	Pass
	9	2452	35.10	0.5	Pass



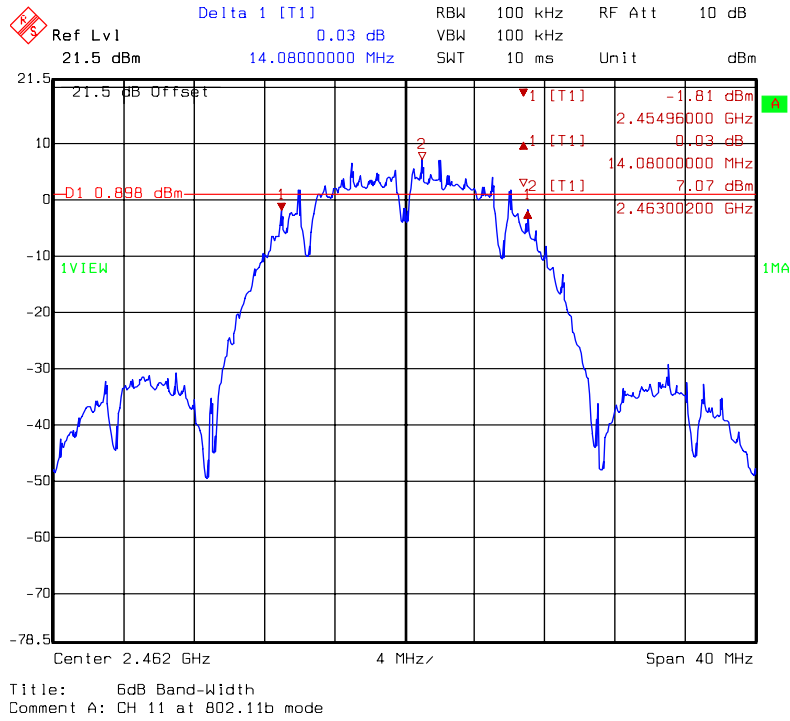
## 6dB Bandwidth @ 802.11b mode channel 1



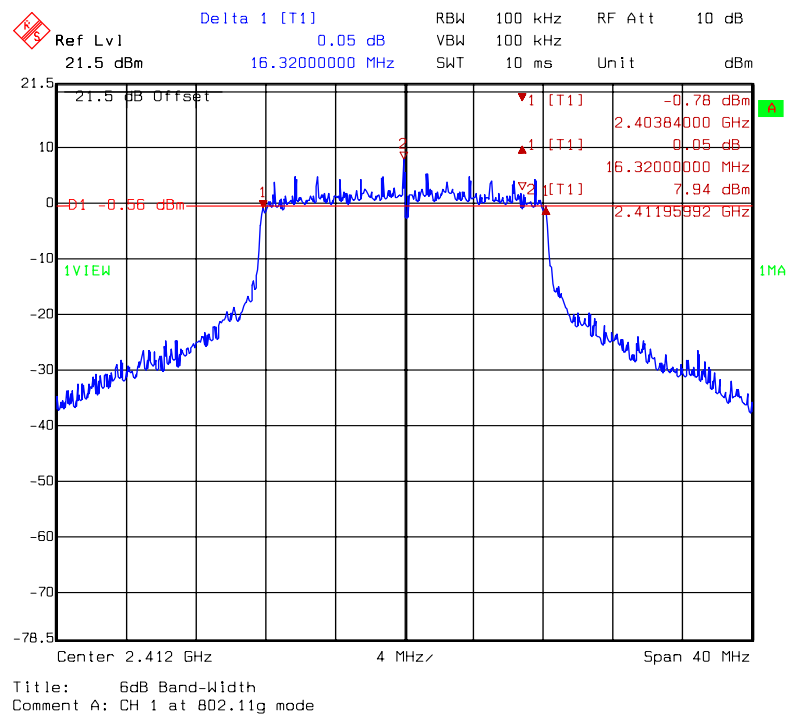
## 6dB Bandwidth @ 802.11b mode channel 6



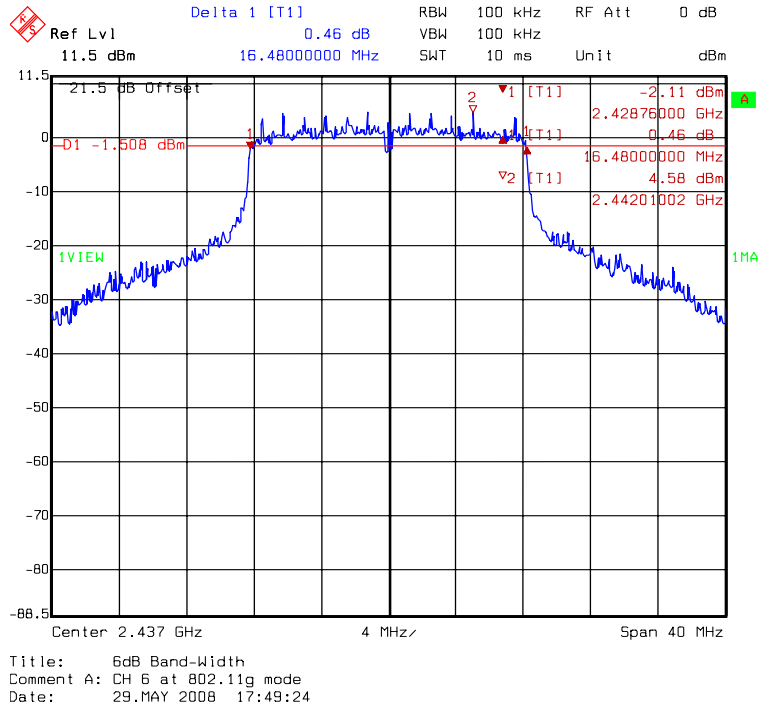
## 6dB Bandwidth @ 802.11b mode channel 11



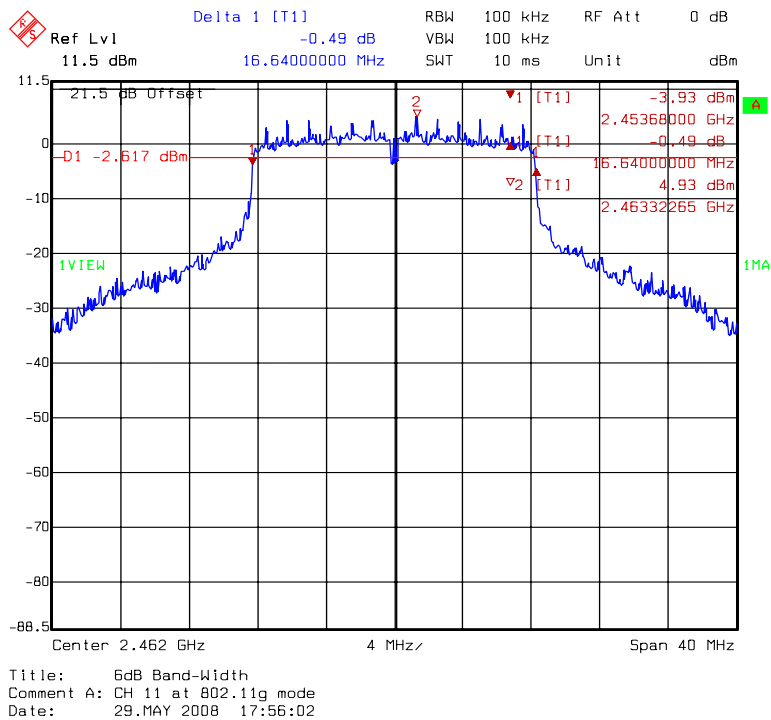
## 6dB Bandwidth @ 802.11g mode channel 1



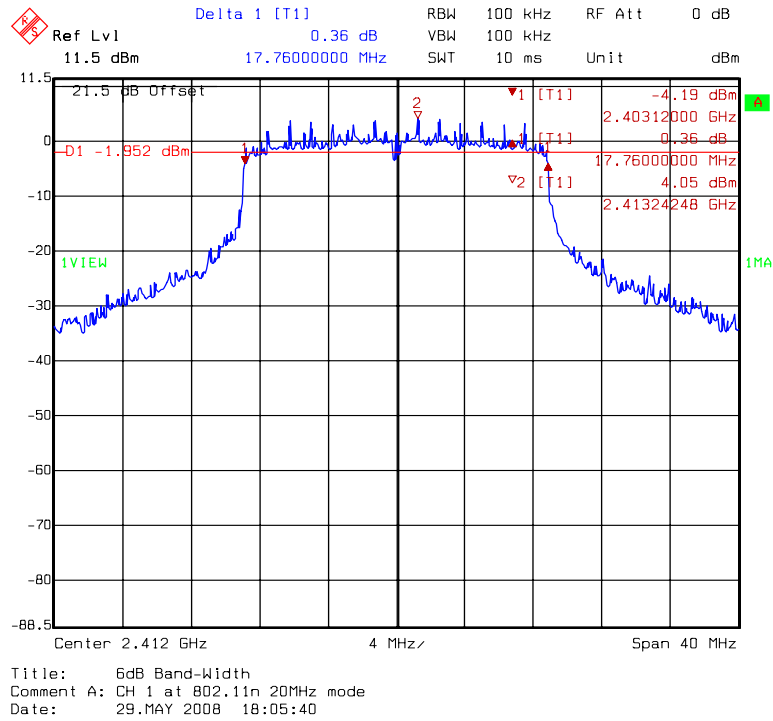
## 6dB Bandwidth @ 802.11g mode channel 6



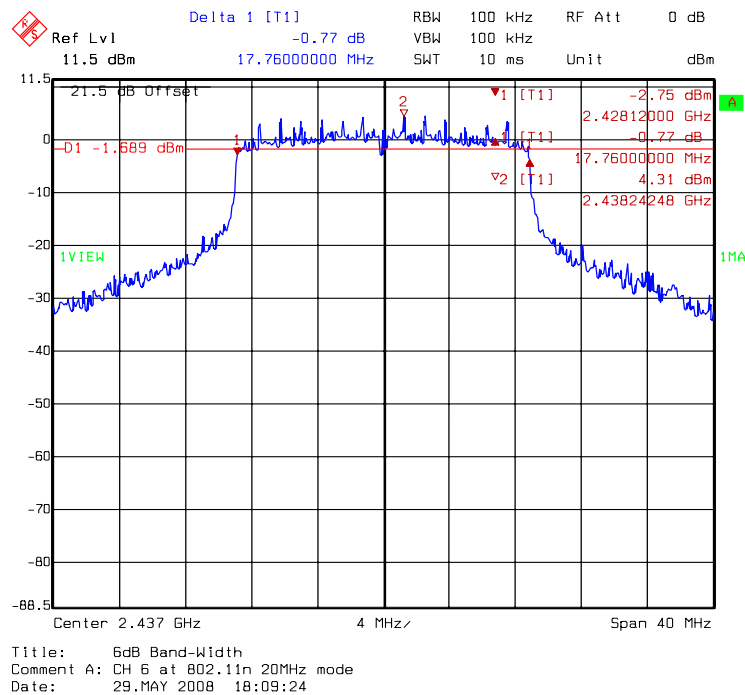
## 6dB Bandwidth @ 802.11g mode channel 11



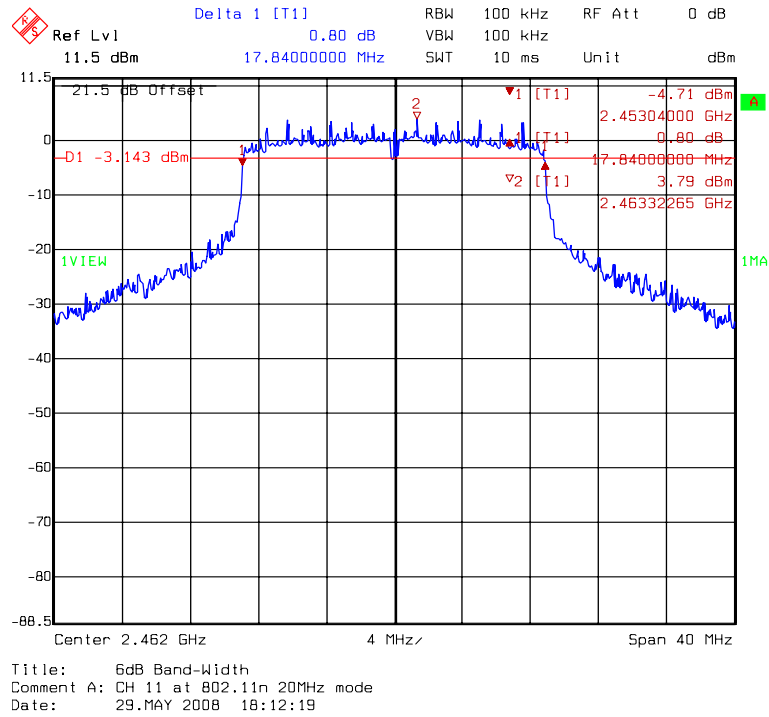
### 6dB Bandwidth @ draft 802.11n HT20 mode channel 1



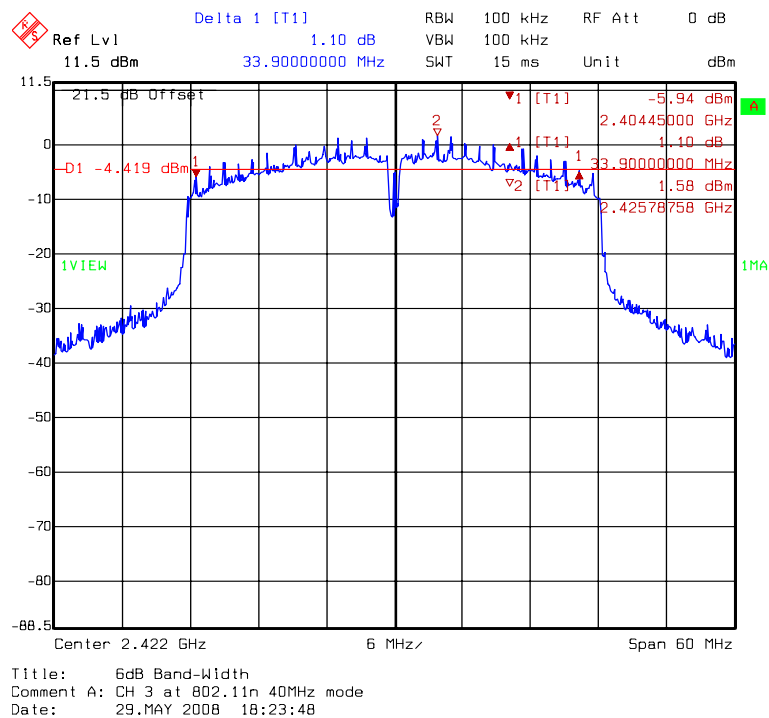
### 6dB Bandwidth @ draft 802.11n HT20 mode channel 6



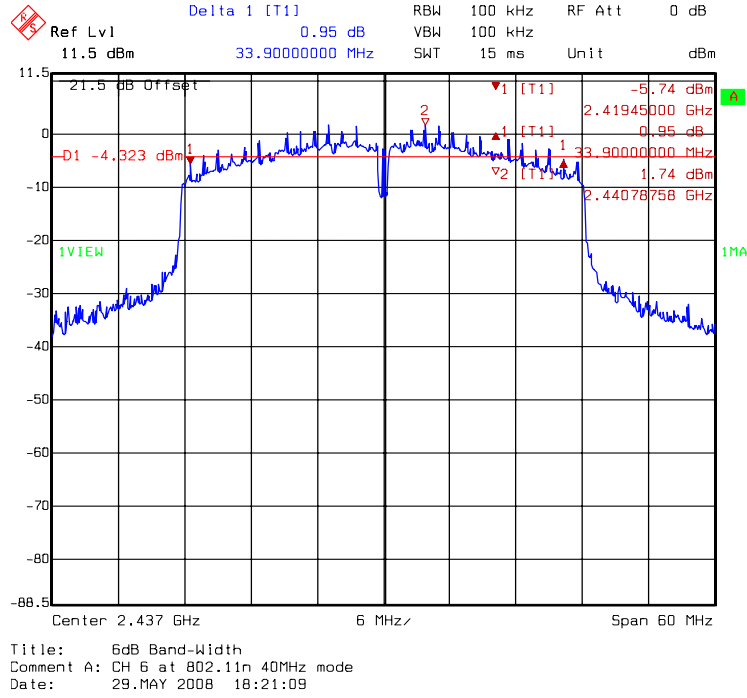
## 6dB Bandwidth @ draft 802.11n HT20 mode channel 11



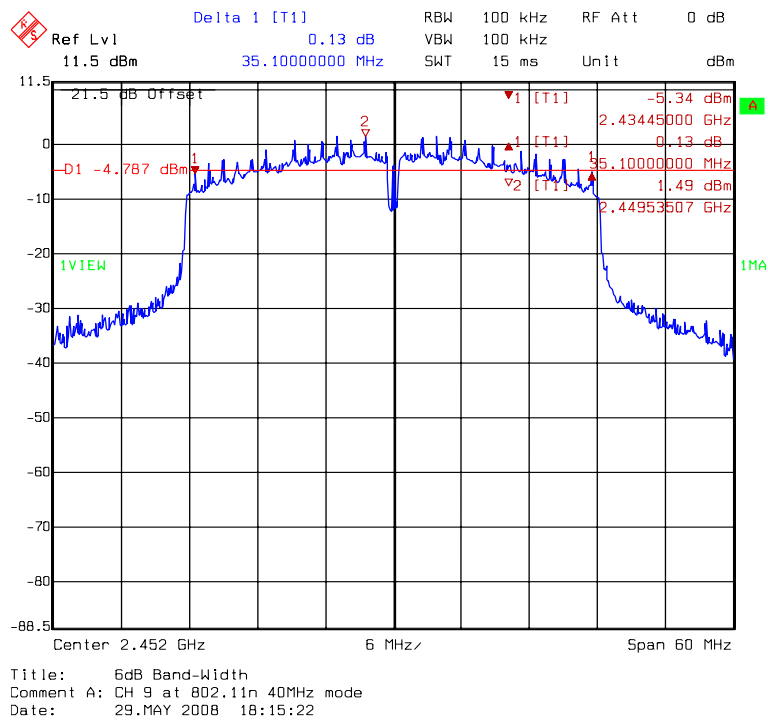
## 6dB Bandwidth @ draft 802.11n HT40 mode channel 3



## 6dB Bandwidth @ draft 802.11n HT40 mode channel 6



## 6dB Bandwidth @ draft 802.11n HT40 mode channel 9



#### 4. 99% Occupied Bandwidth

<b>Name of Test</b>	99% Occupied Bandwidth
<b>Base Standard</b>	None; for reporting purposes only

**Tested By:** Rex Liao  
**Test Date:** May 29, 2008

**Test Equipment:** EC1365

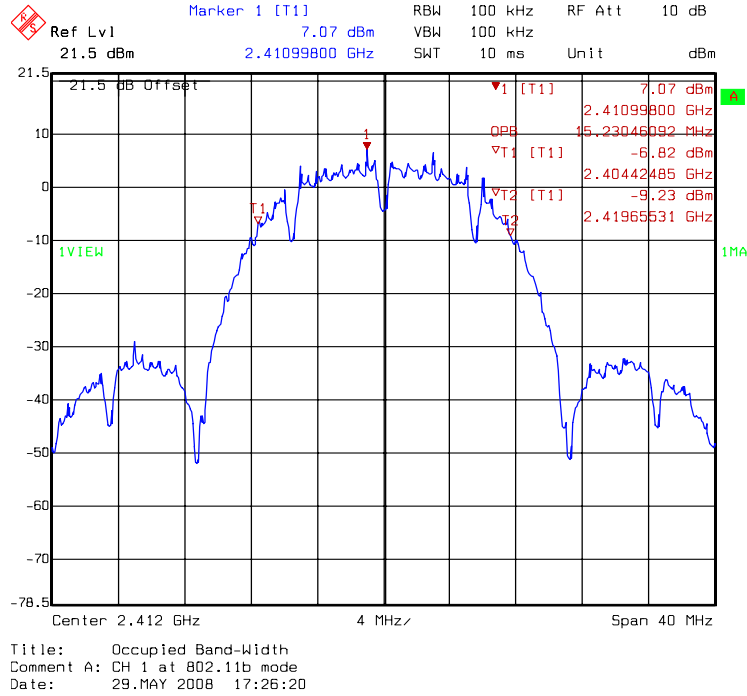
**Test Result:** Complies  
**Test Method:** See Appendix B  
**Measurement Data:** See Table & plots below

**Note:** The EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle and high channel.

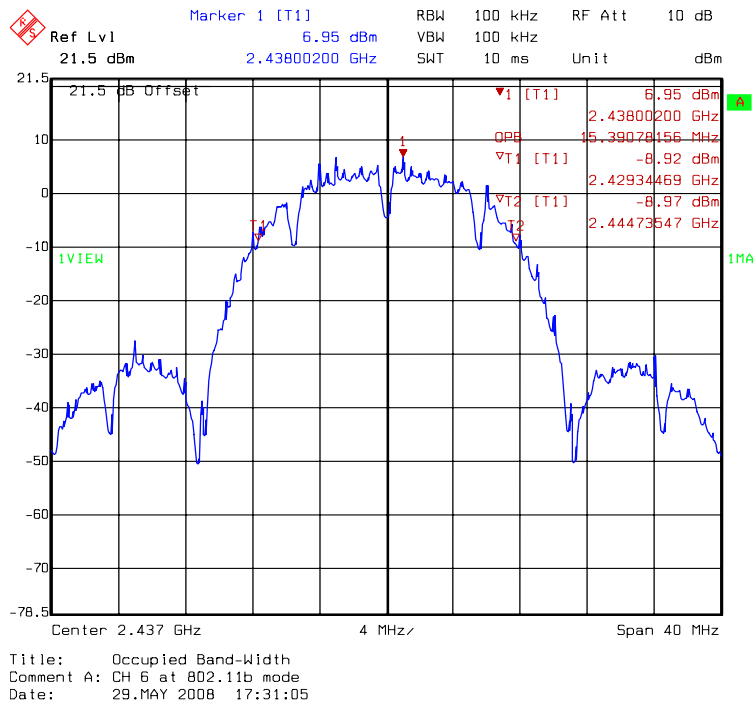
Table2. 99% Occupied Bandwidth

Mode	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
11b	1	2412	15.23
	6	2437	15.39
	11	2462	15.39
11g	1	2412	16.43
	6	2437	16.59
	11	2462	16.59
HT20	1	2412	17.72
	6	2437	17.80
	11	2462	17.72
HT40	3	2422	35.47
	6	2437	35.47
	9	2452	35.47

### 99% Occupied Bandwidth @ 802.11b mode channel 1

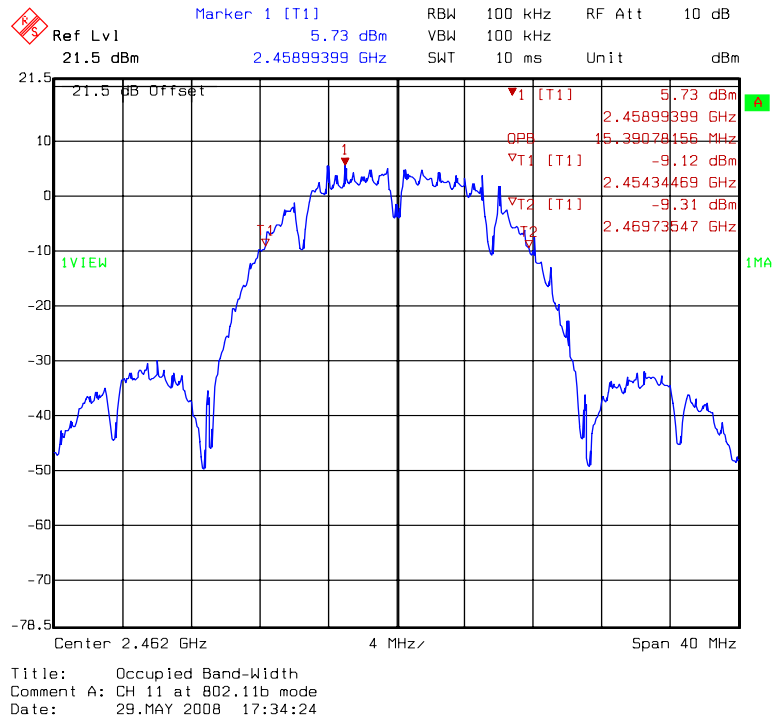


### 99% Occupied Bandwidth @ 802.11b mode channel 6

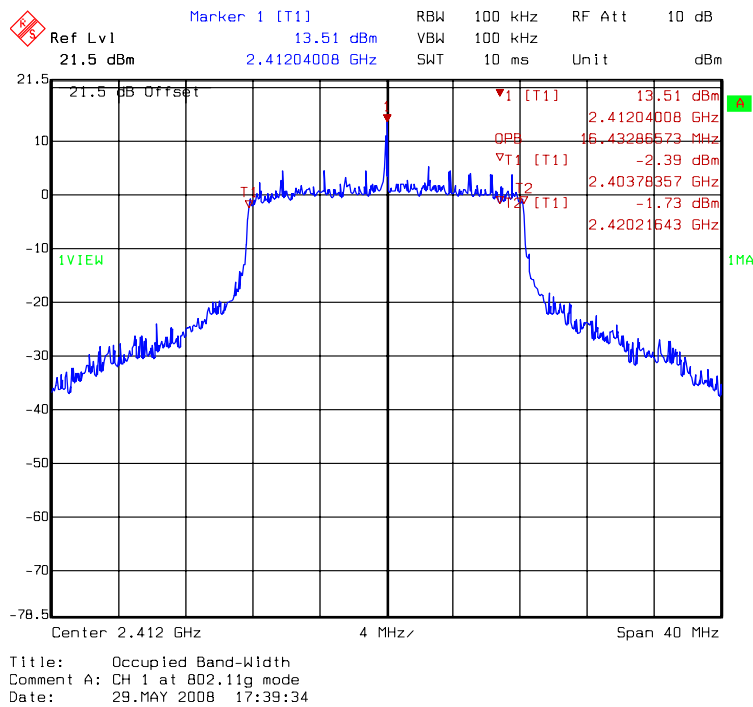




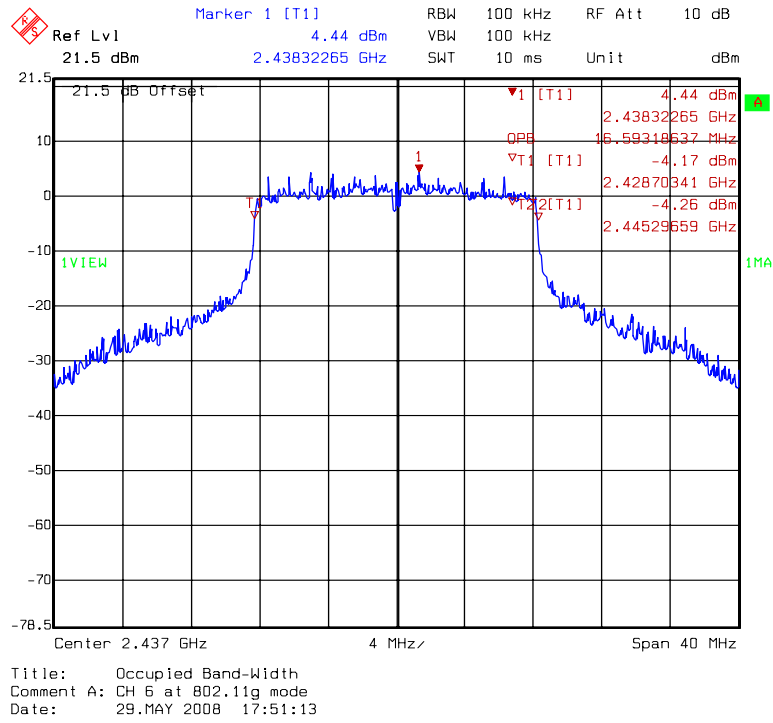
## 99% Occupied Bandwidth @ 802.11b mode channel 11



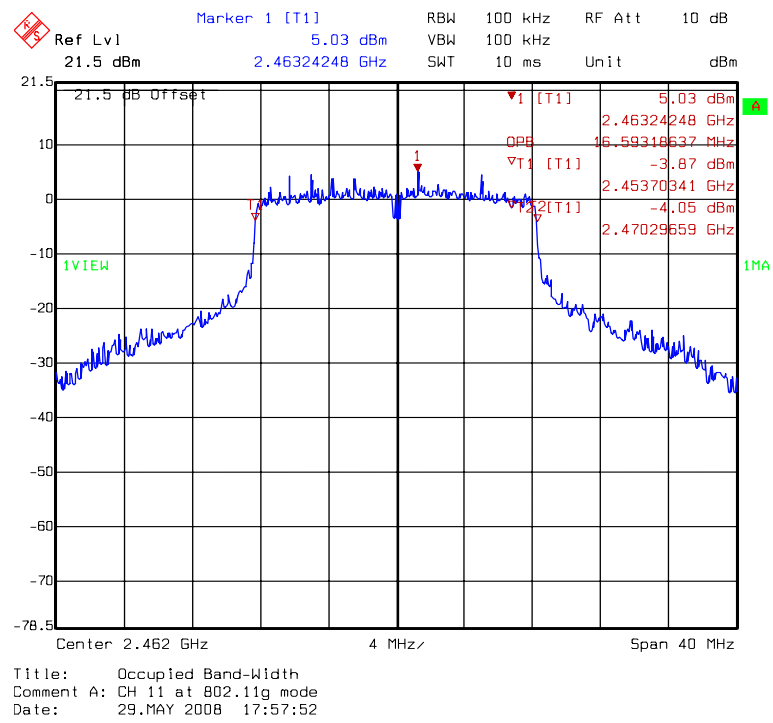
## 99% Occupied Bandwidth @ 802.11g mode channel 1



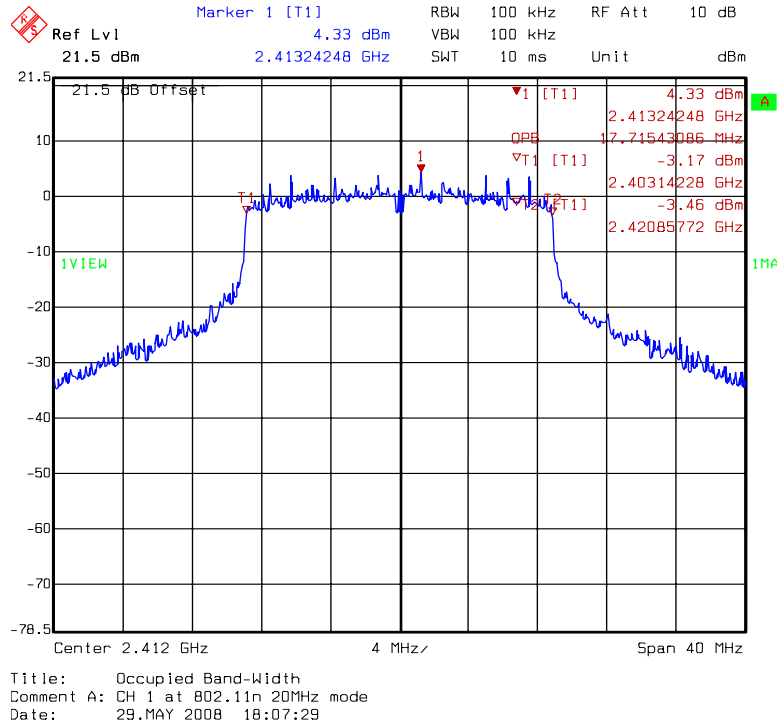
### 99% Occupied Bandwidth @ 802.11g mode channel 6



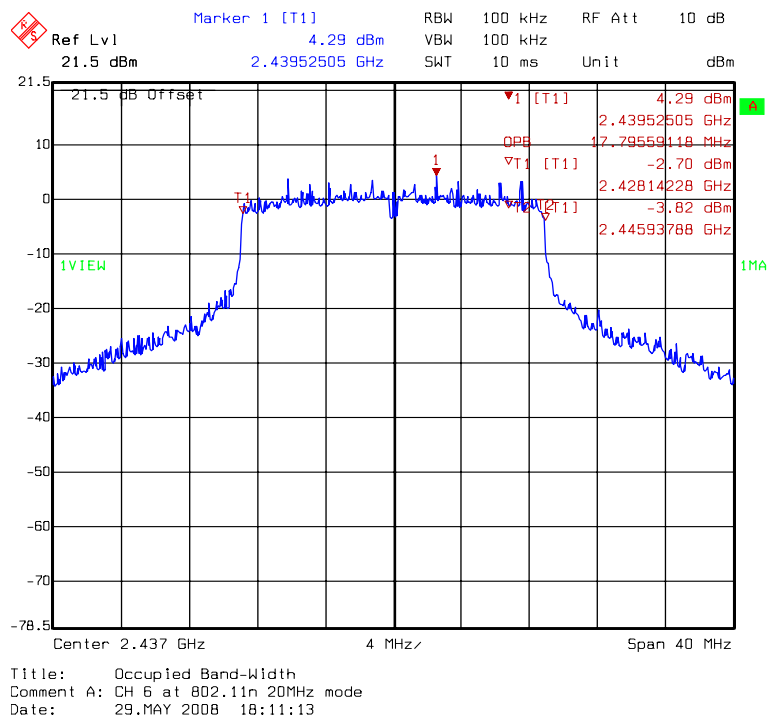
### 99% Occupied Bandwidth @ 802.11g mode channel 11



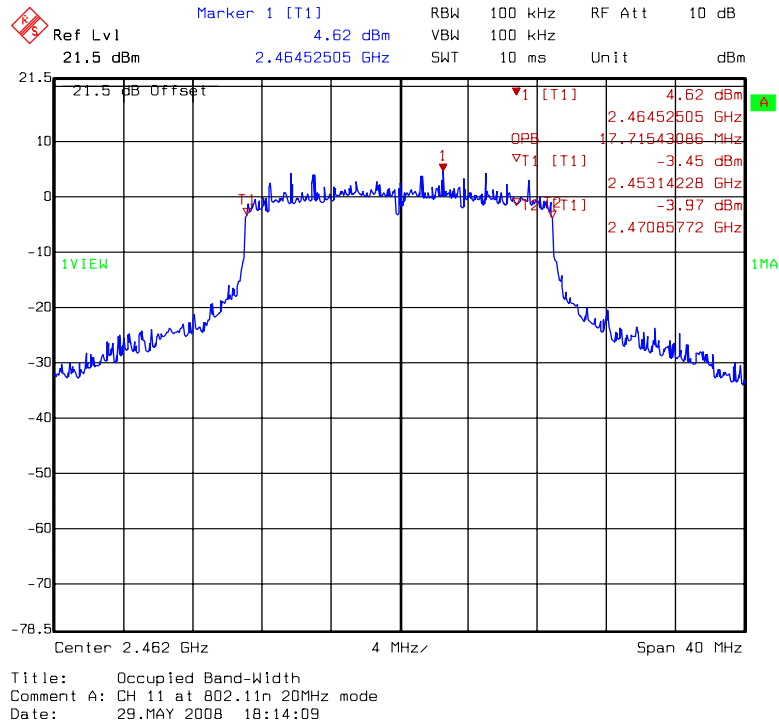
## 99% Occupied Bandwidth @ draft 802.11n HT20 mode channel 1



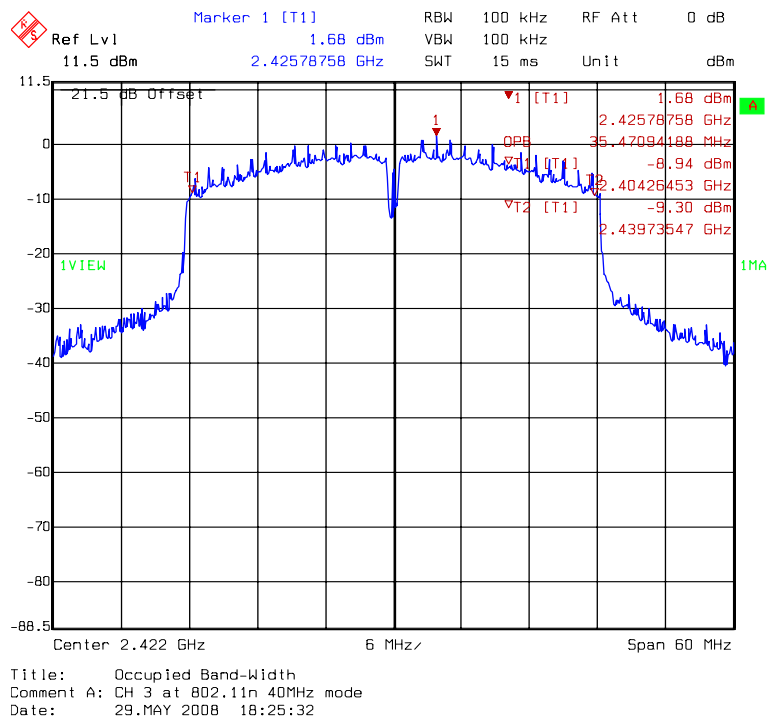
## 99% Occupied Bandwidth @ draft 802.11n HT20 mode channel 6



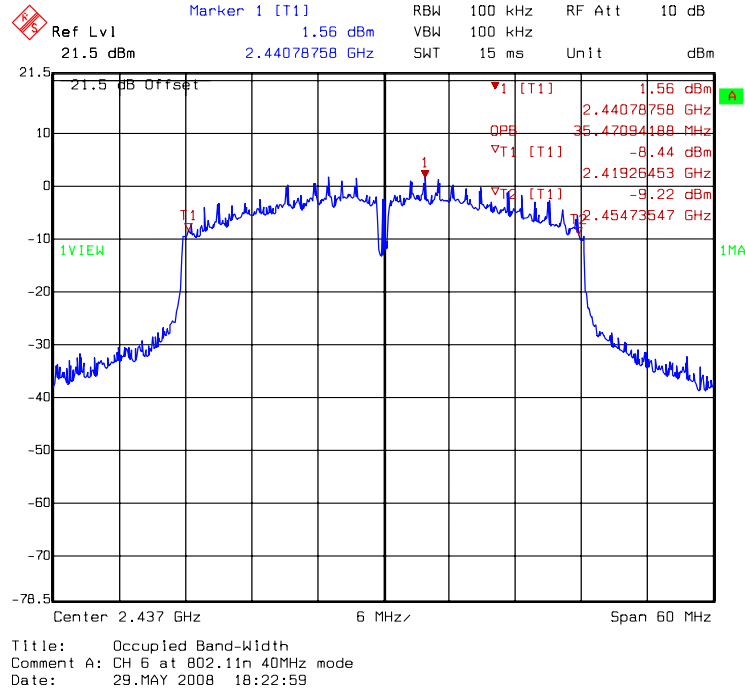
## 99% Occupied Bandwidth @ draft 802.11n HT20 mode channel 11



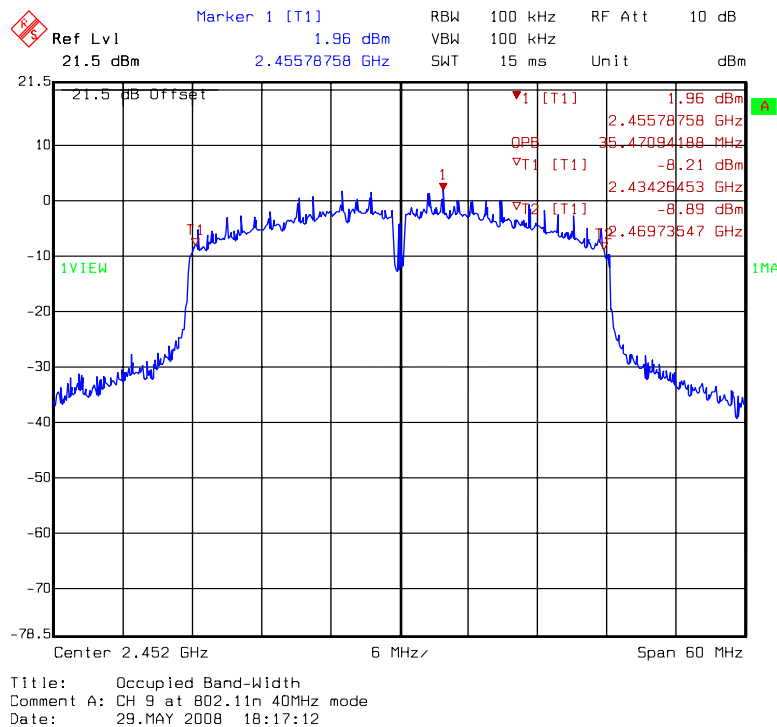
## 99% Occupied Bandwidth @ draft 802.11n HT40 mode channel 3



### 99% Occupied Bandwidth @ draft 802.11n HT40 mode channel 6



### 99% Occupied Bandwidth @ draft 802.11n HT40 mode channel 9



## 5. Maximum Output Power

<b>Name of Test</b>	Maximum output power
<b>Base Standard</b>	FCC 15.247(b)

**Tested By:** Rex Liao  
**Test Date:** May 29, 2008

**Test Equipment:** EC1396, EC1396-1  
**Measurement Uncertainty:** ±2dB (k=2)

**Test Result:** Complies  
**Test Method:** See Appendix A  
**Measurement Data:** See Table below

**Note:** The EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle and high channel.

Table3. Maximum output power

### Test mode: 802.11b mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (W)
				(dBm)	(mW)	
1 (lowest)	2412	2	17.89	19.89	97.50	1
6 (middle)	2437	2	18.12	20.12	102.80	1
11 (highest)	2462	2	17.90	19.90	97.72	1

### Test mode: 802.11g mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (W)
				(dBm)	(mW)	
1 (lowest)	2412	2	21.15	23.15	206.54	1
6 (middle)	2437	2	22.48	24.48	280.54	1
11 (highest)	2462	2	22.28	24.28	267.92	1

Remark:

Conducted Peak Output Power = Reading + C.L.

**Test mode: 802.11n HT20 mode**

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (W)
				(dBm)	(mW)	
1 (lowest)	2412	2	22.13	24.13	258.82	1
6 (middle)	2437	2	22.09	24.09	256.45	1
11 (highest)	2462	2	20.91	22.91	195.43	1

**Test mode: 802.11n HT40 mode**

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (W)
				(dBm)	(mW)	
3 (lowest)	2422	2	20.52	22.52	178.65	1
6 (middle)	2437	2	20.86	22.86	193.20	1
9 (highest)	2452	2	20.58	22.58	181.13	1

Remark:

Conducted Peak Output Power = Reading + C.L.

## 6. Power Spectral Density

<b>Name of Test</b>	Power Spectral Density
<b>Base Standard</b>	FCC 15.247(e)

**Tested By:** Rex Liao  
**Test Date:** May 29, 2008

**Test Equipment:** EC1365

**Test Result:** Complies  
**Test Method:** See Appendix B  
**Measurement Data:** See Table & plots below

**Note:** The EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle and high channel.

Table4. Power Spectral Density

### Test Mode: 802.11b mode

Channel	Frequency (MHz)	Cable loss (dB)	Power spectrum density (dBm)	Limit (dBm)
1 (lowest)	2412	2	-8.17	8
6 (middle)	2437	2	-9.34	8
11 (highest)	2462	2	-8.11	8

### Test Mode: 802.11g mode

Channel	Frequency (MHz)	Cable loss (dB)	Power spectrum density (dBm)	Limit (dBm)
1 (lowest)	2412	2	-11.24	8
6 (middle)	2437	2	-11.93	8
11 (highest)	2462	2	-12.37	8



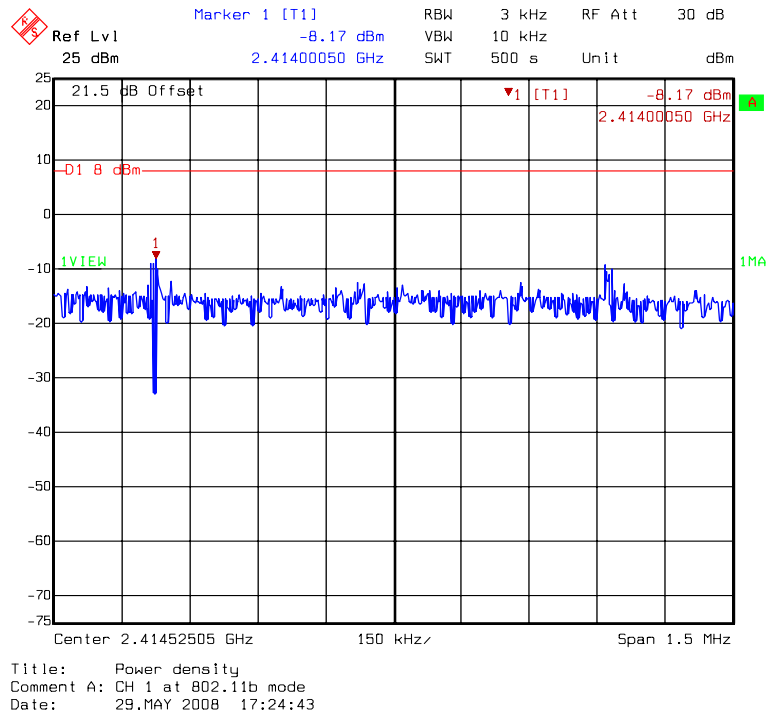
**Test Mode: 802.11n HT20 mode**

Channel	Frequency (MHz)	Cable loss (dB)	Power spectrum density (dBm)	Limit (dBm)
1 (lowest)	2412	2	-12.11	8
6 (middle)	2437	2	-12.29	8
11 (highest)	2462	2	-10.77	8

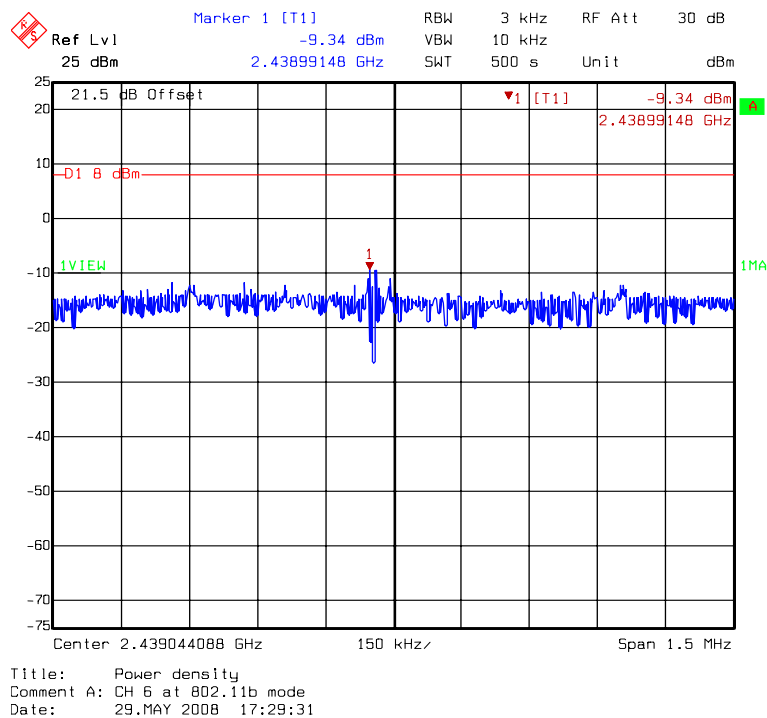
**Test Mode: 802.11n HT40 mode**

Channel	Frequency (MHz)	Cable loss (dB)	Power spectrum density (dBm)	Limit (dBm)
3 (lowest)	2422	2	-14.80	8
6 (middle)	2437	2	-15.23	8
9 (highest)	2452	2	-13.45	8

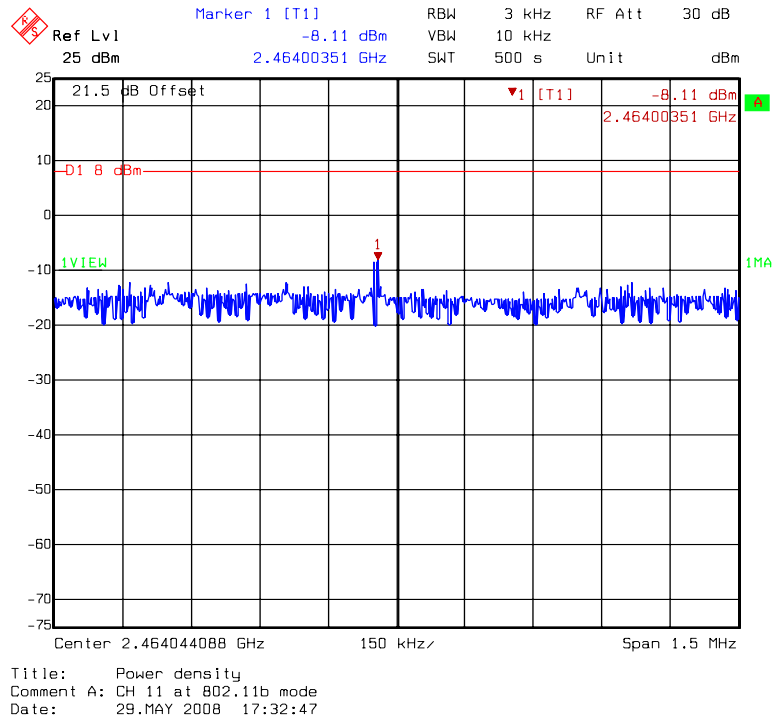
## Power Spectral Density @ 802.11b mode channel 1



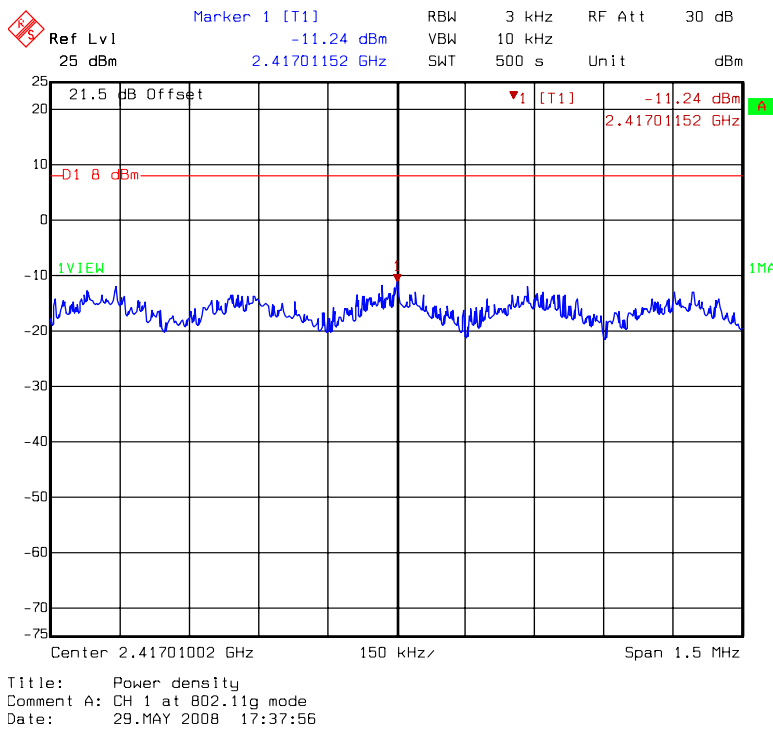
## Power Spectral Density @ 802.11b mode channel 6



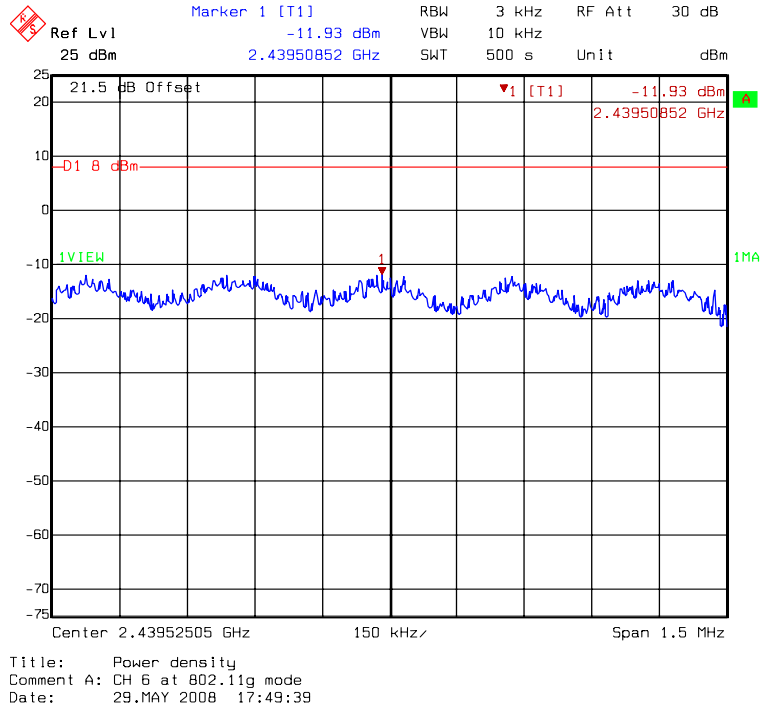
## Power Spectral Density @ 802.11b mode channel 11



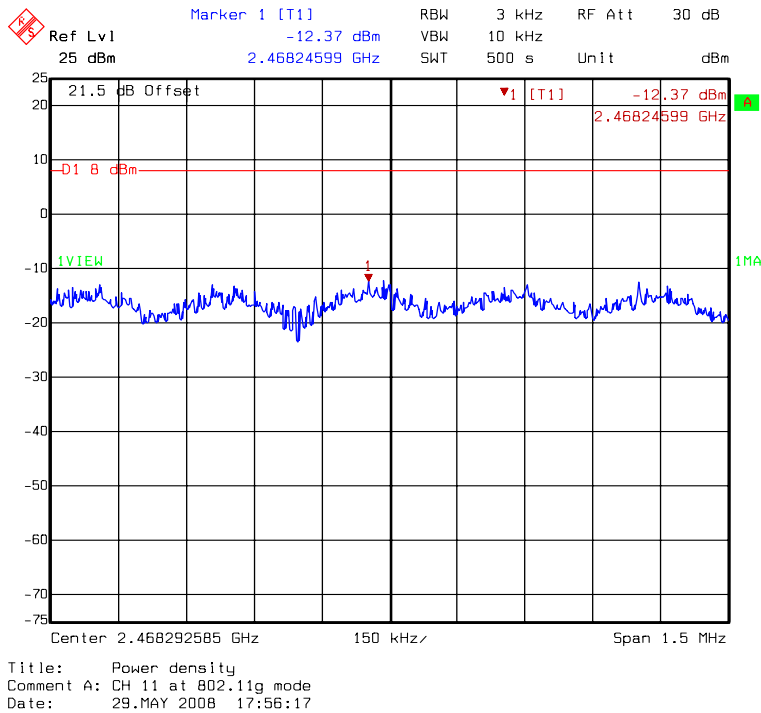
## Power Spectral Density @ 802.11g mode channel 1



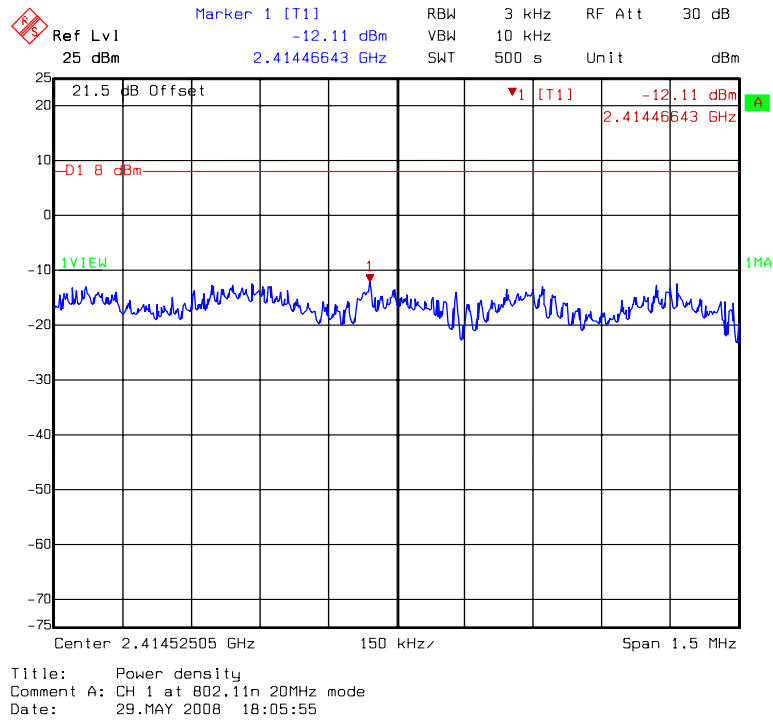
### Power Spectral Density @ 802.11g mode channel 6



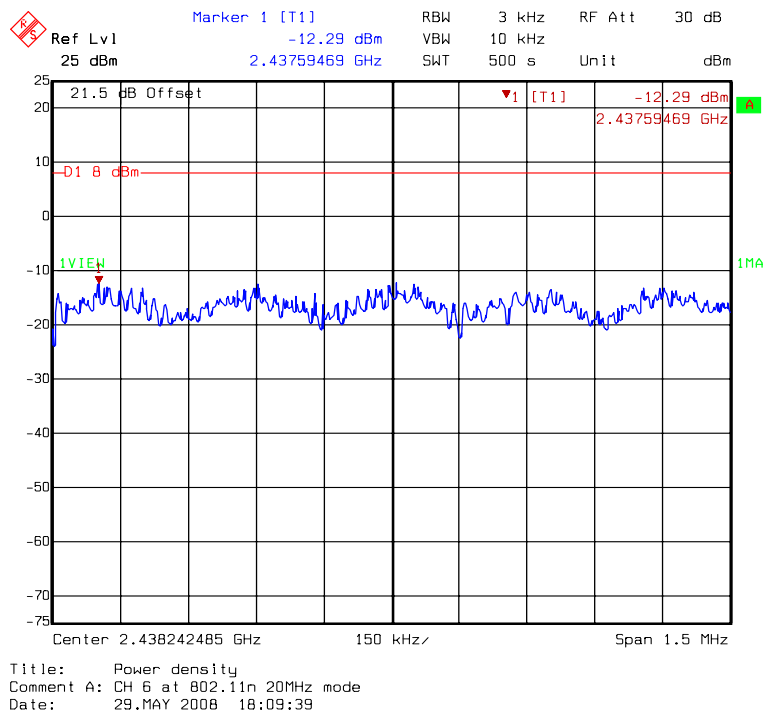
### Power Spectral Density @ 802.11g mode channel 11



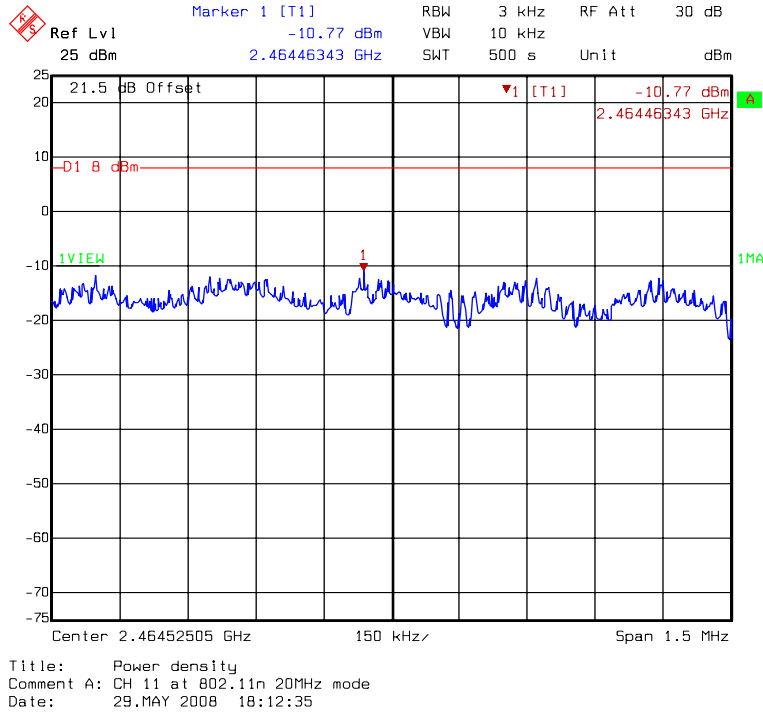
## Power Spectral Density @ draft 802.11n HT20 mode channel 1



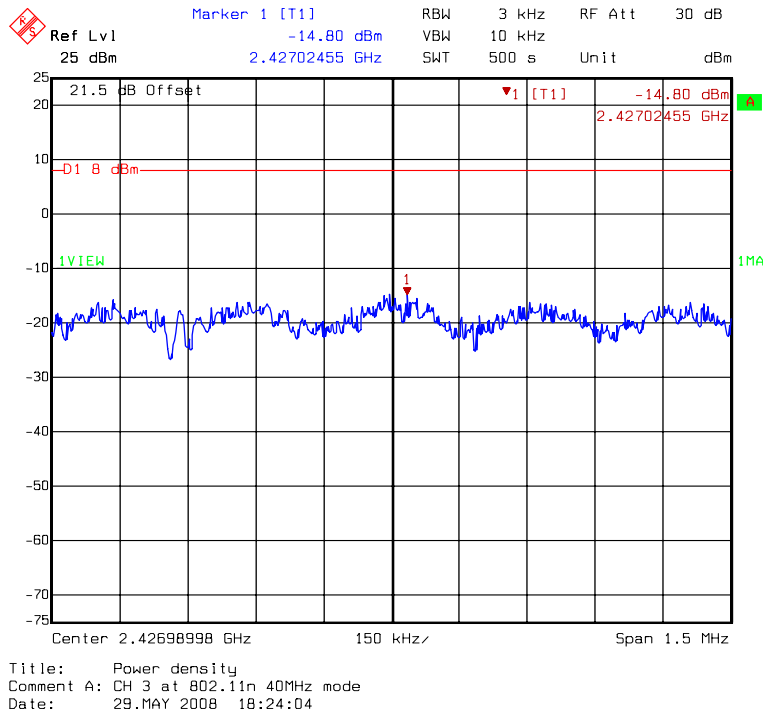
## Power Spectral Density @ draft 802.11n HT20 mode channel 6



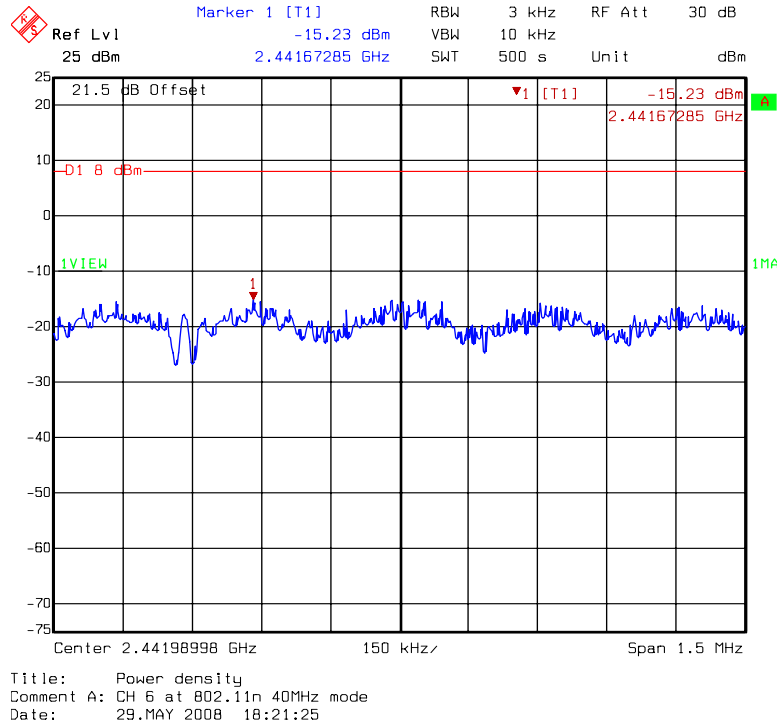
Power Spectral Density @ draft 802.11n HT20 mode channel 11



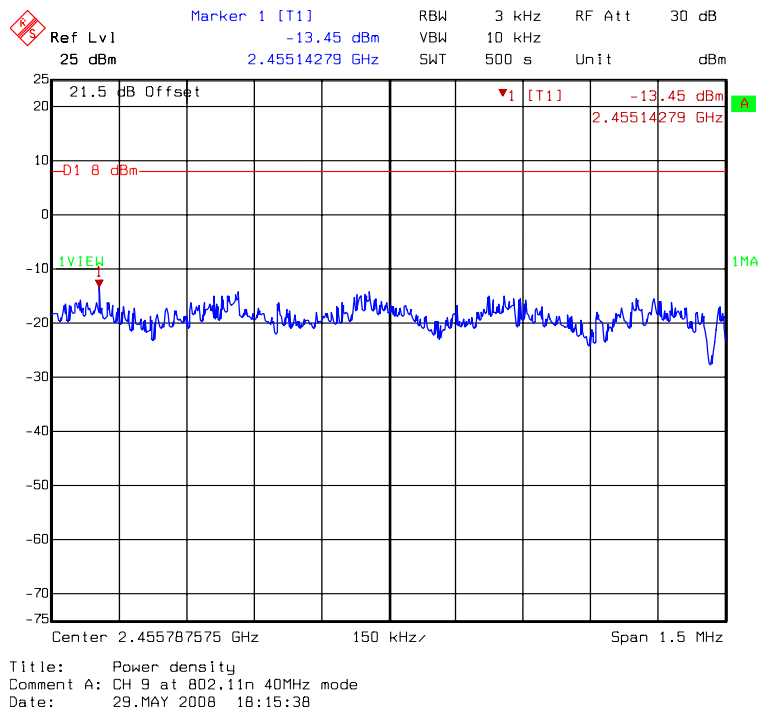
Power Spectral Density @ draft 802.11n HT40 mode channel 3



### Power Spectral Density @ draft 802.11n HT40 mode channel 6



### Power Spectral Density @ draft 802.11n HT40 mode channel 9



## 7. RF Antenna conducted Spurious

<b>Name of Test</b>	RF Antenna Conducted Spurious
<b>Base Standard</b>	FCC 15.247(d)

**Tested By:** Rex Liao  
**Test Date:** May 29, 2008

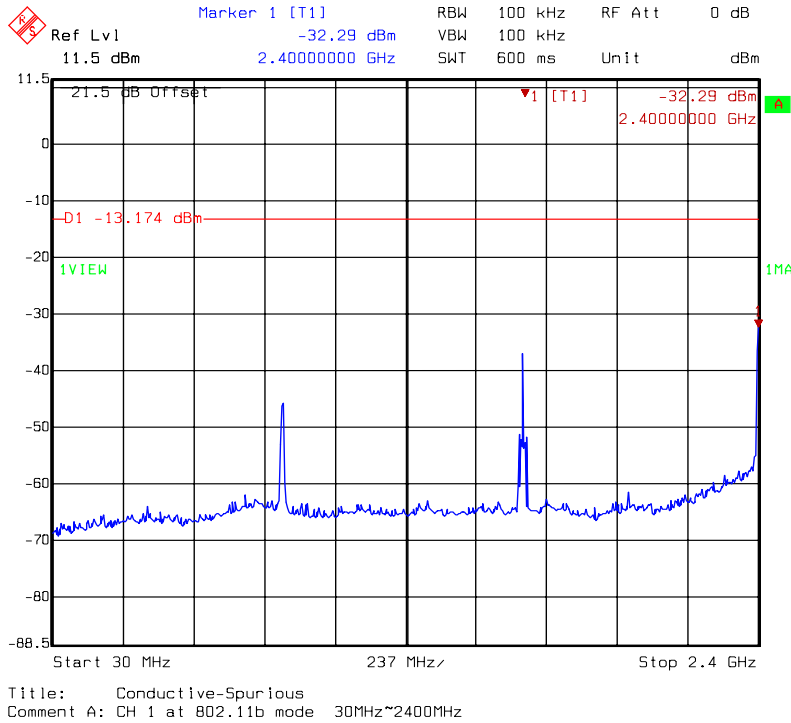
**Test Equipment:** EC1365

**Test Result:** Complies  
**Test Method:** See Appendix C  
**Measurement Data:** See plots below

**Note:** (1) The EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle and high channel.  
(2) The EUT operating at 2.4GHz ISM band. Frequency Range scanned from 30MHz to 25GHz.



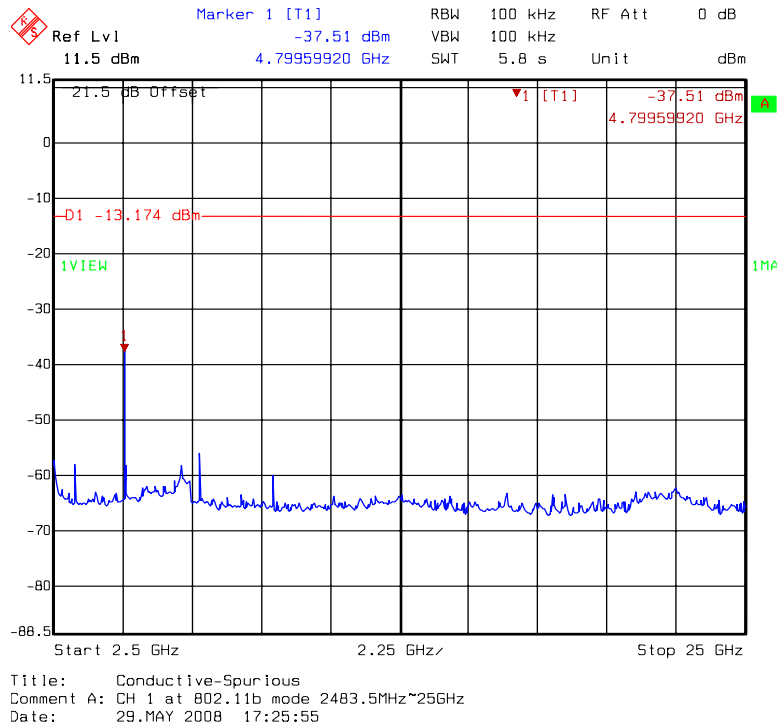
## conducted spurious @ 802.11b mode channel 1 (1of 3)



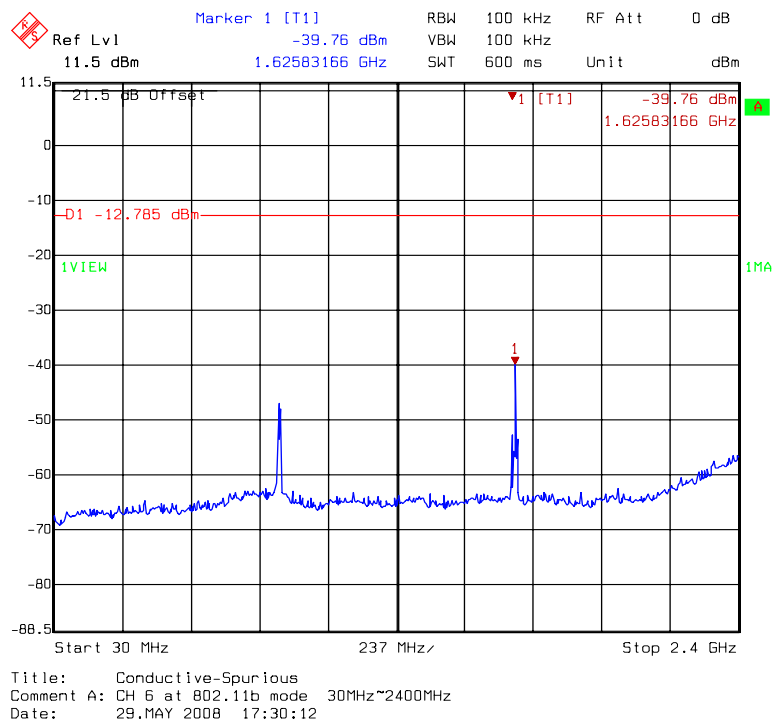
## conducted spurious @ 802.11b mode channel 1 (2of 3)



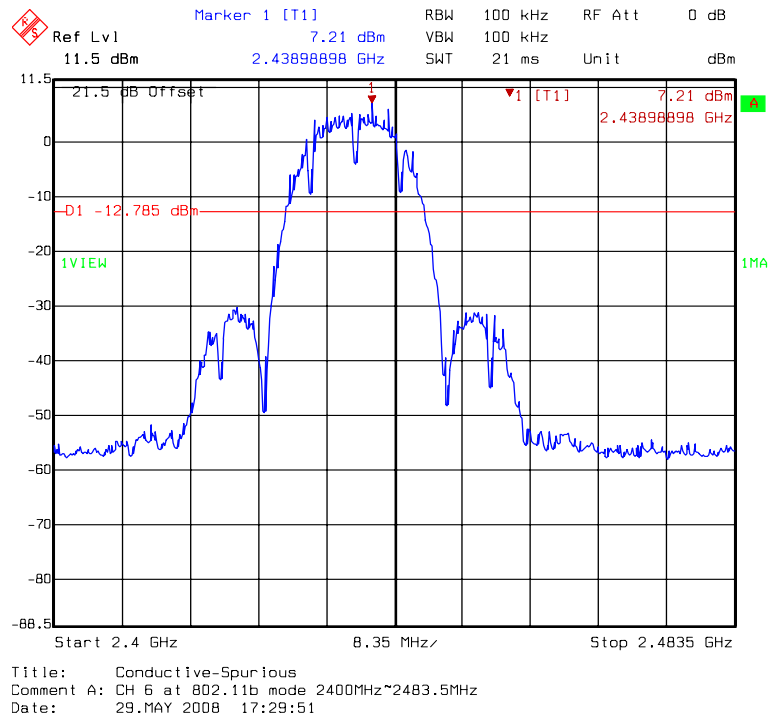
## conducted spurious @ 802.11b mode channel 1 (3of 3)



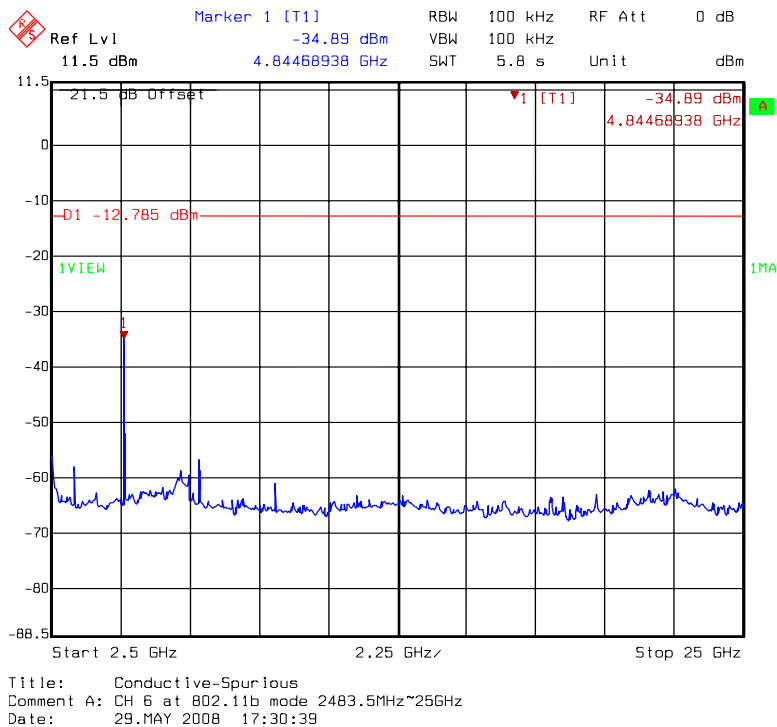
## conducted spurious @ 802.11b mode channel 6 (1of 3)



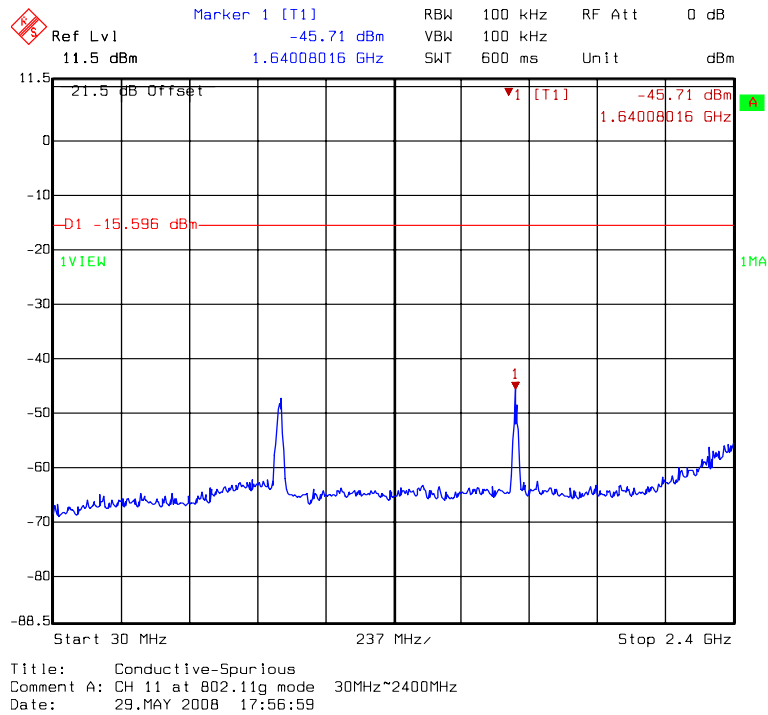
conducted spurious @ 802.11b mode channel 6 (2of 3)



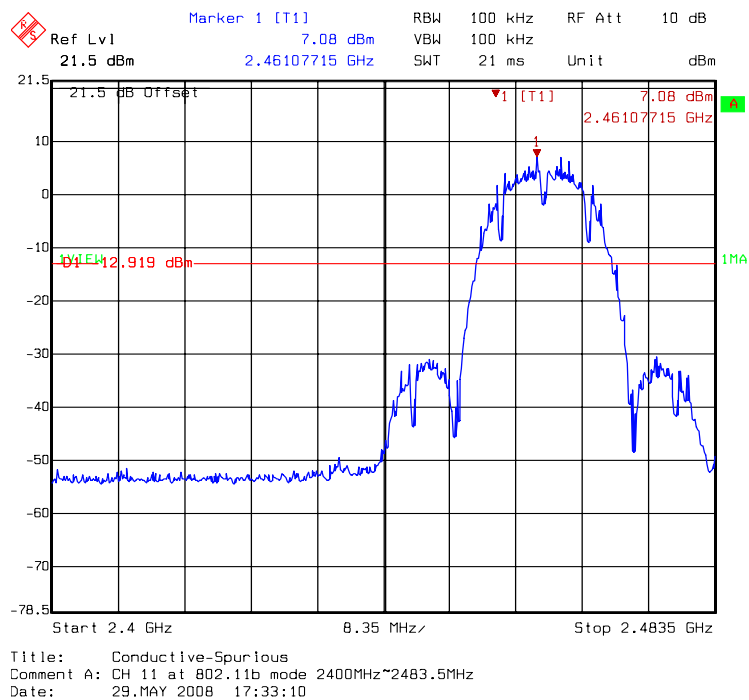
conducted spurious @ 802.11b mode channel 6 (3of 3)



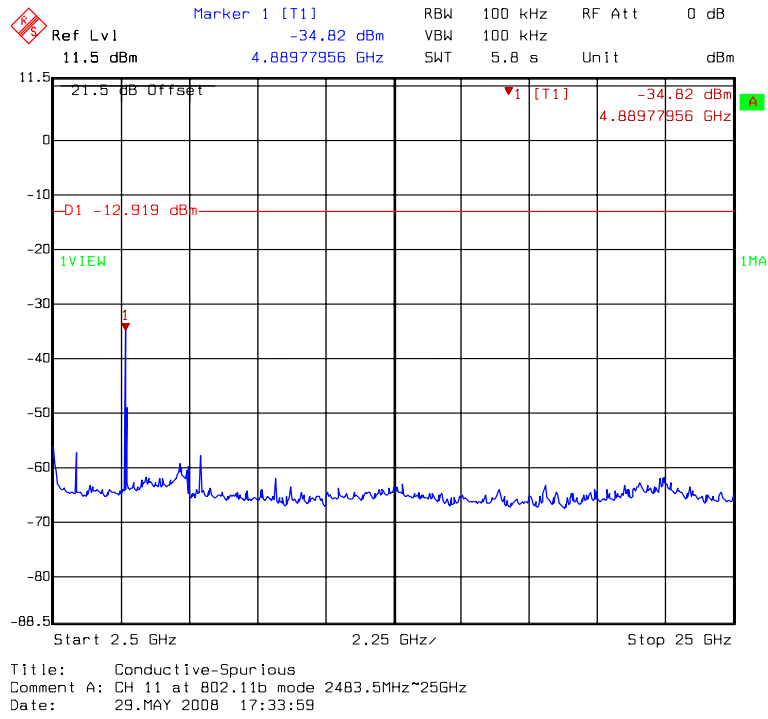
conducted spurious @ 802.11b mode channel 11 (1of 3)



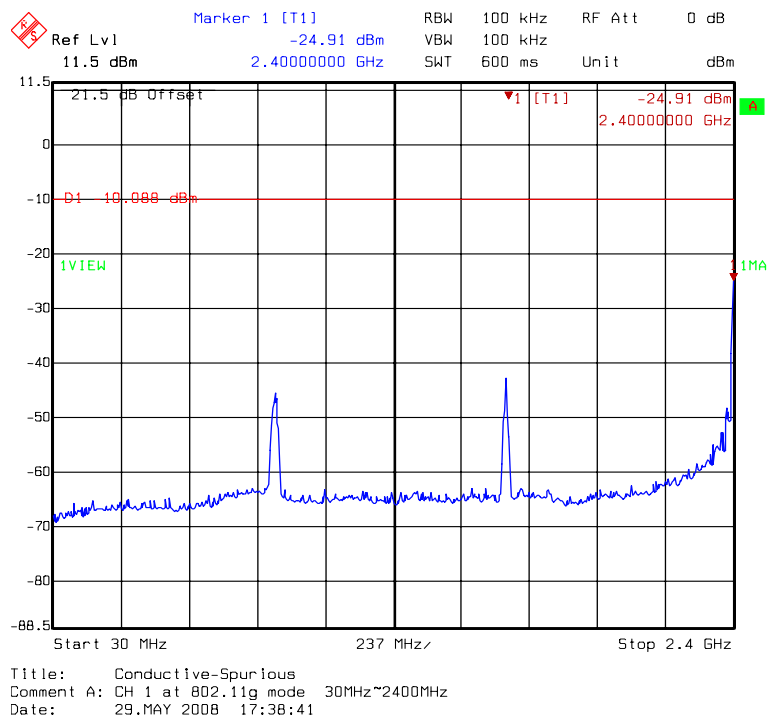
conducted spurious @ 802.11b mode channel 11 (2of 3)



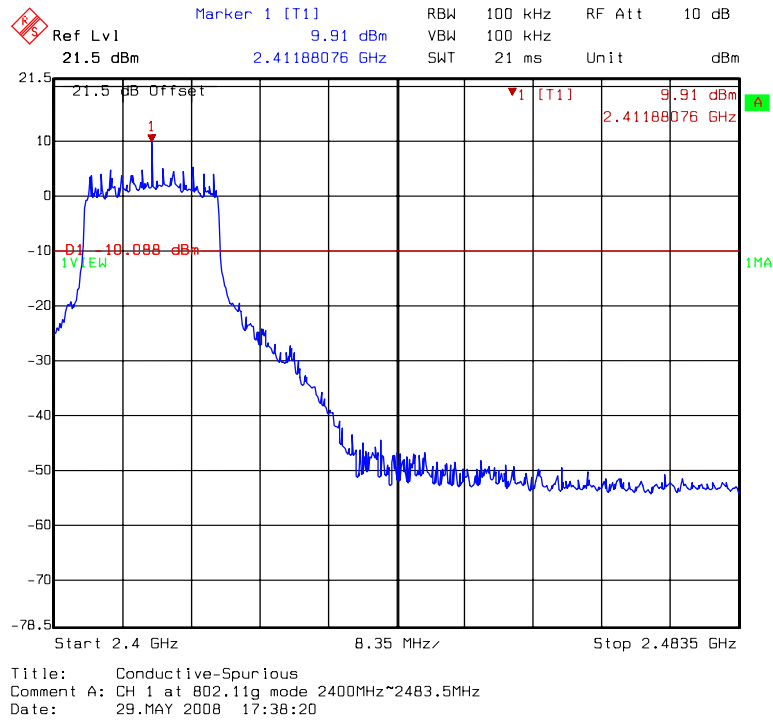
conducted spurious @ 802.11b mode channel 11 (3of 3)



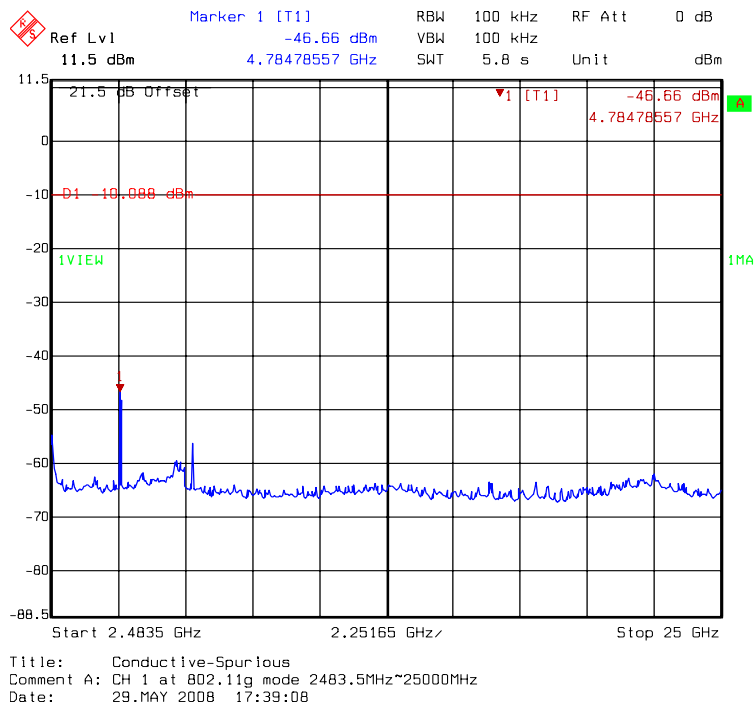
conducted spurious @ 802.11g mode channel 1 (1of 3)



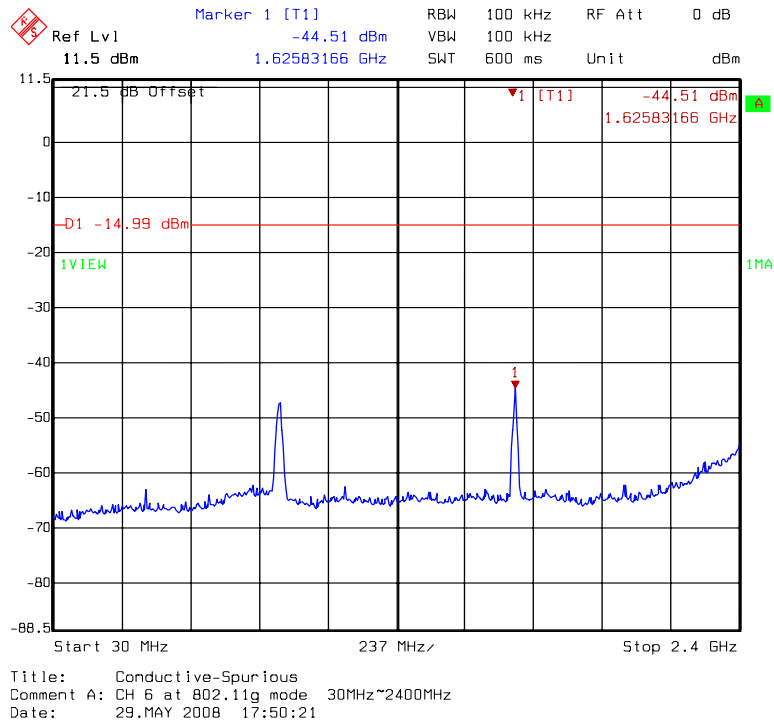
## conducted spurious @ 802.11g mode channel 1 (2of 3)



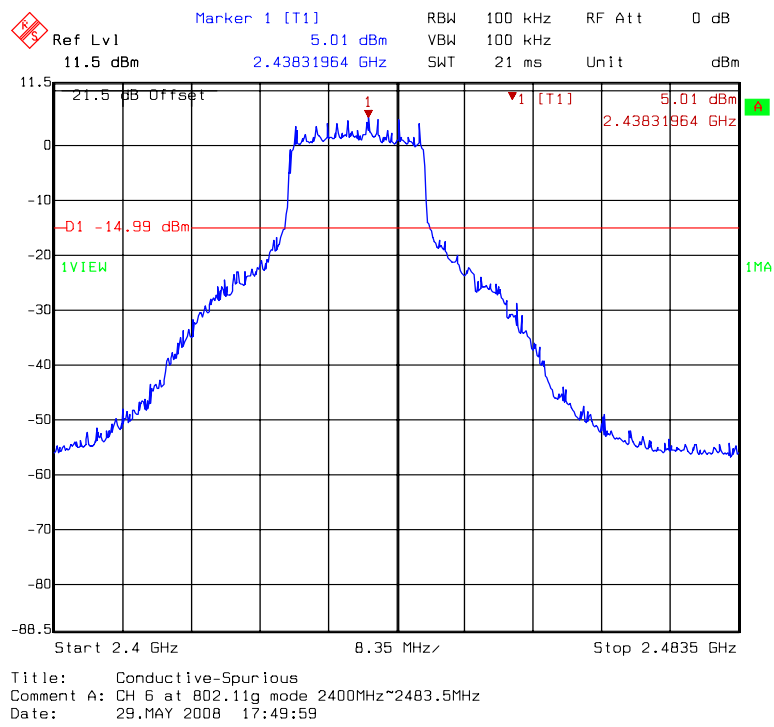
## conducted spurious @ 802.11g mode channel 1 (3of 3)



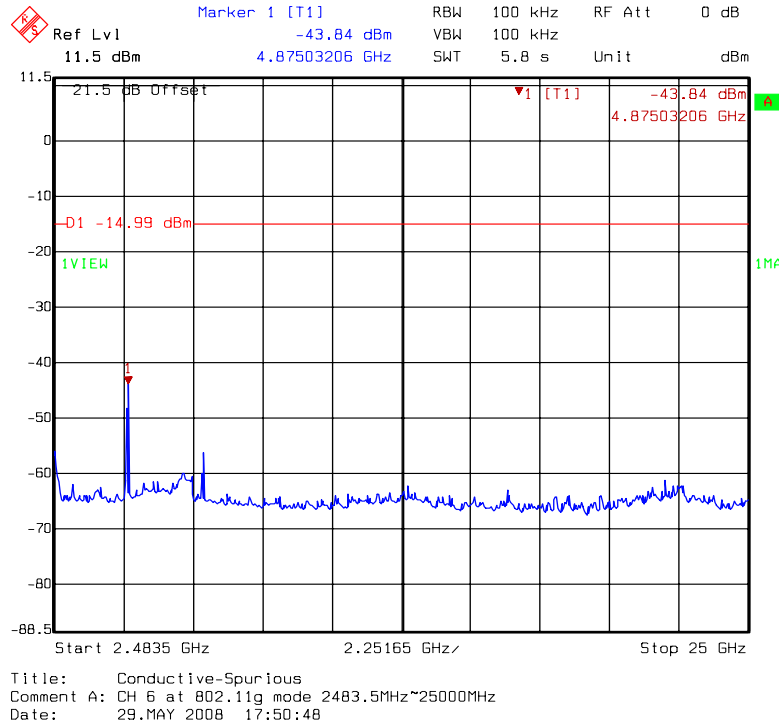
conducted spurious @ 802.11g mode channel 6 (1of 3)



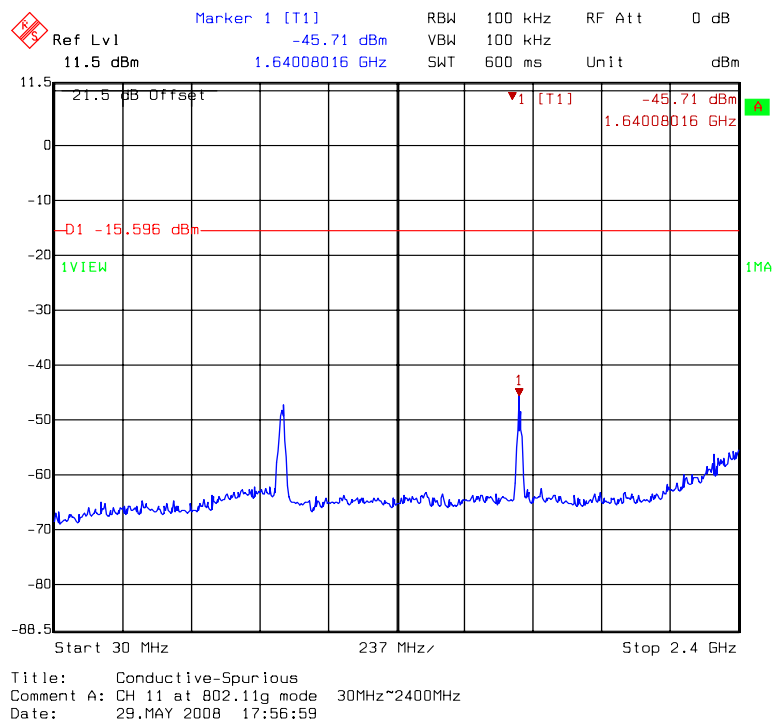
conducted spurious @ 802.11g mode channel 6 (2of 3)



conducted spurious @ 802.11g mode channel 6 (3of 3)

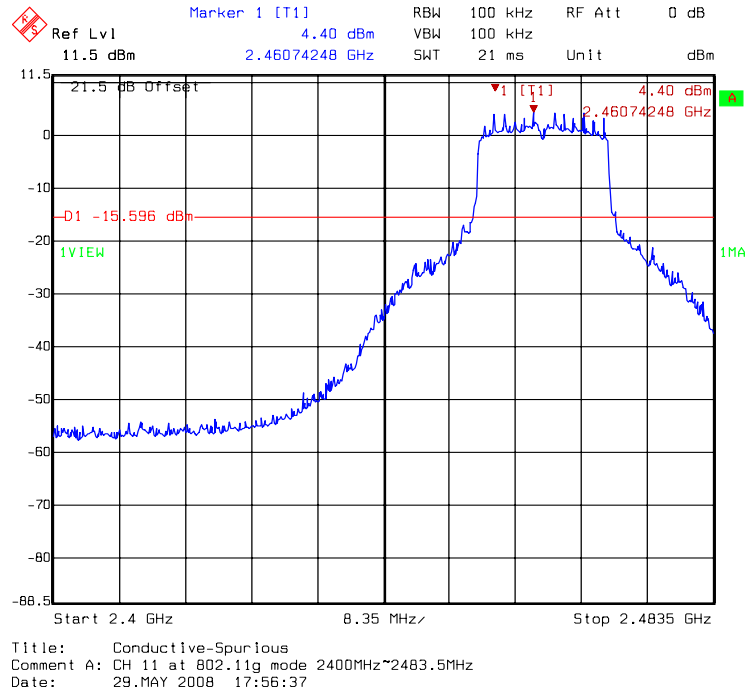


conducted spurious @ 802.11g mode channel 11 (1of 3)

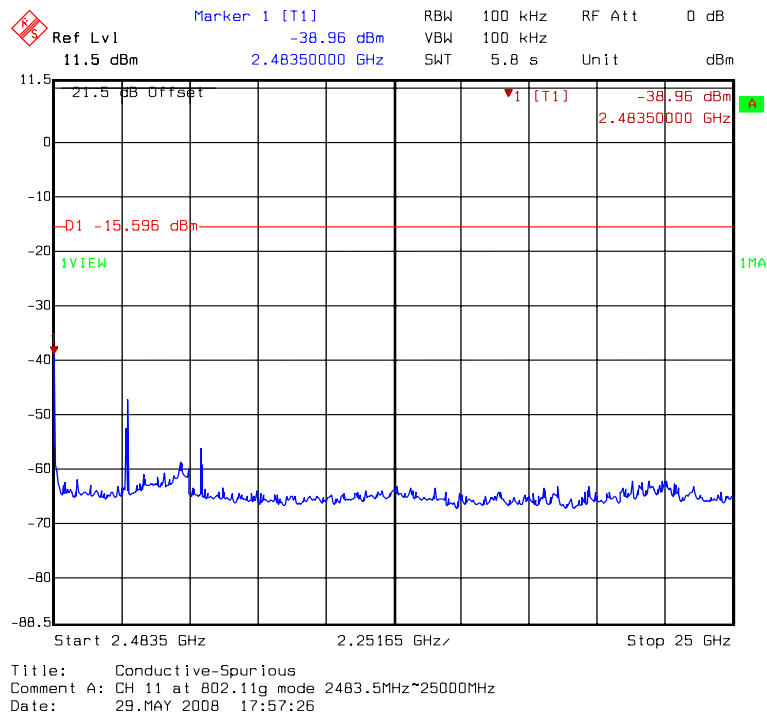




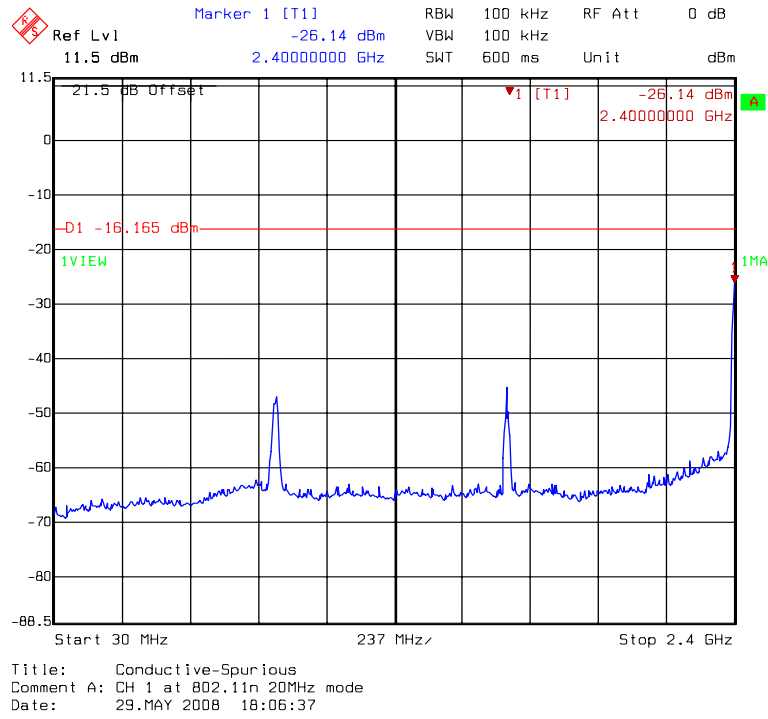
conducted spurious @ 802.11g mode channel 11 (2of 3)



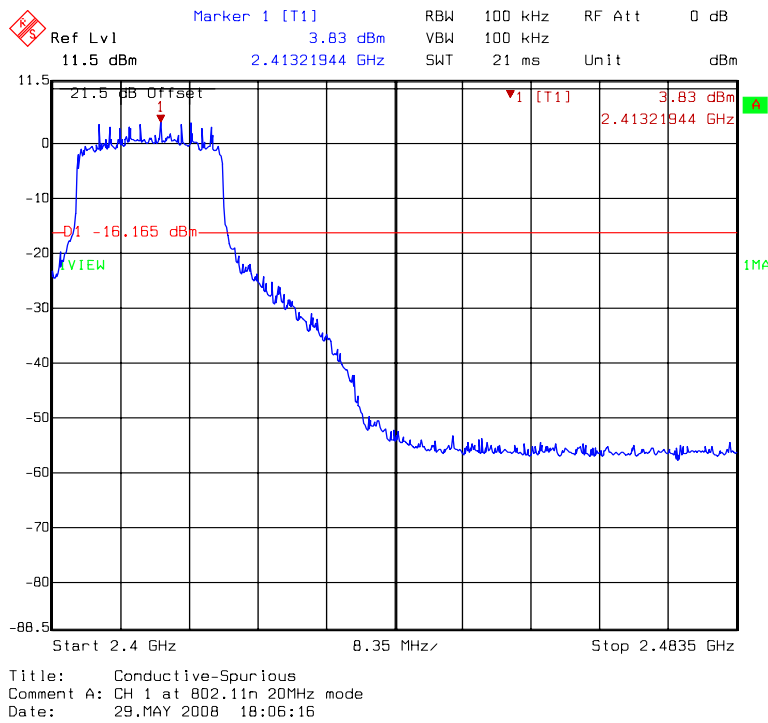
conducted spurious @ 802.11g mode channel 11 (3of 3)



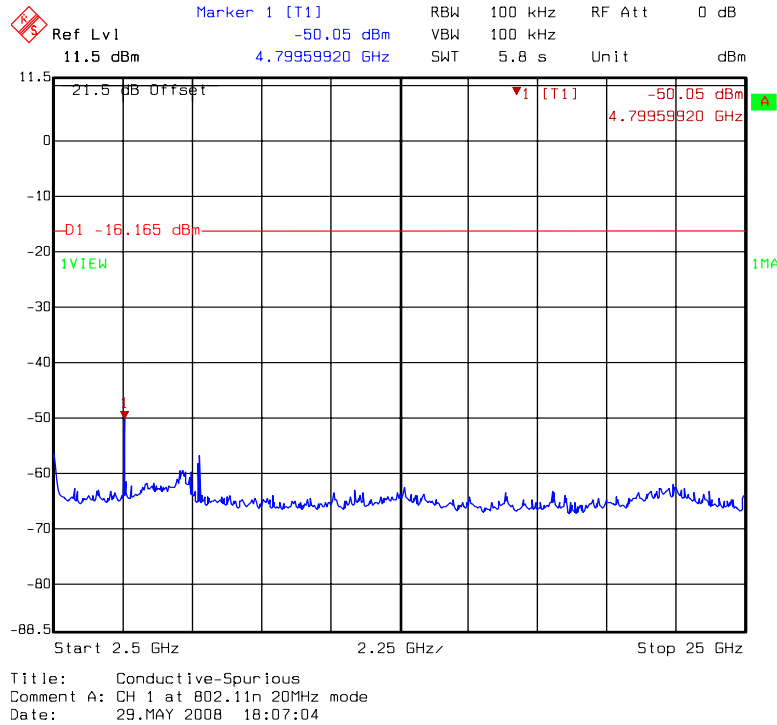
conducted spurious @ draft 802.11n HT20 mode channel 1 (1of 3)



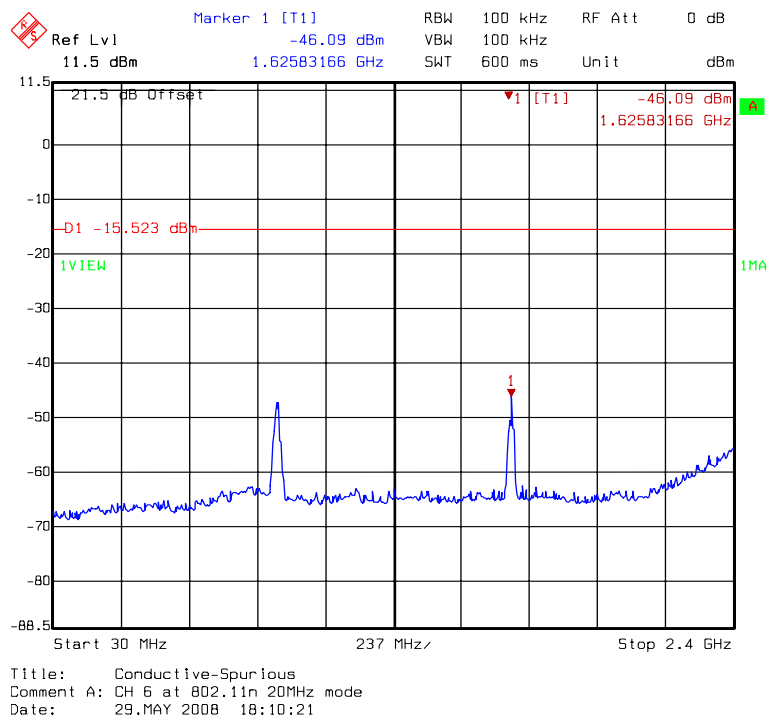
conducted spurious @ draft 802.11n HT20 mode channel 1 (2of 3)



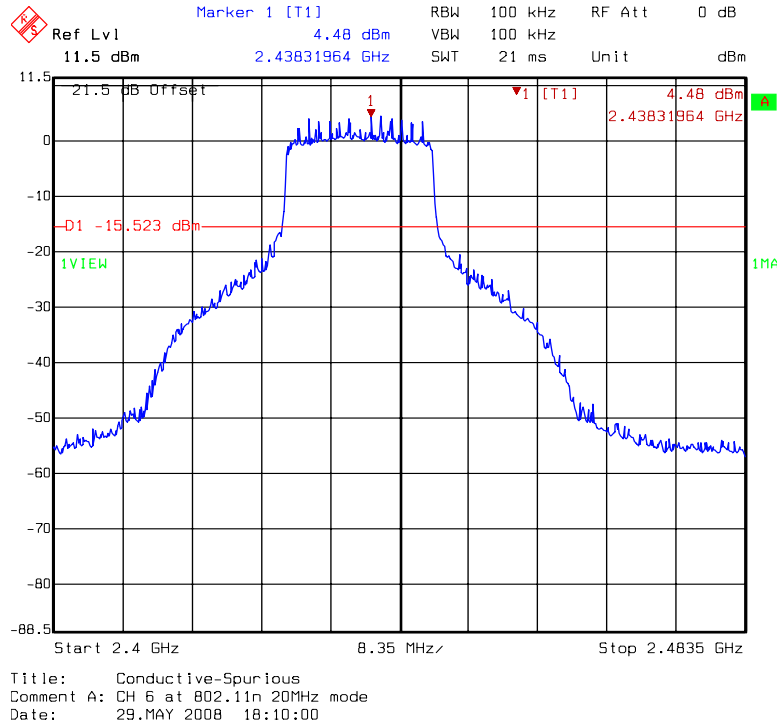
## conducted spurious @ draft 802.11n HT20 mode channel 1 (3of 3)



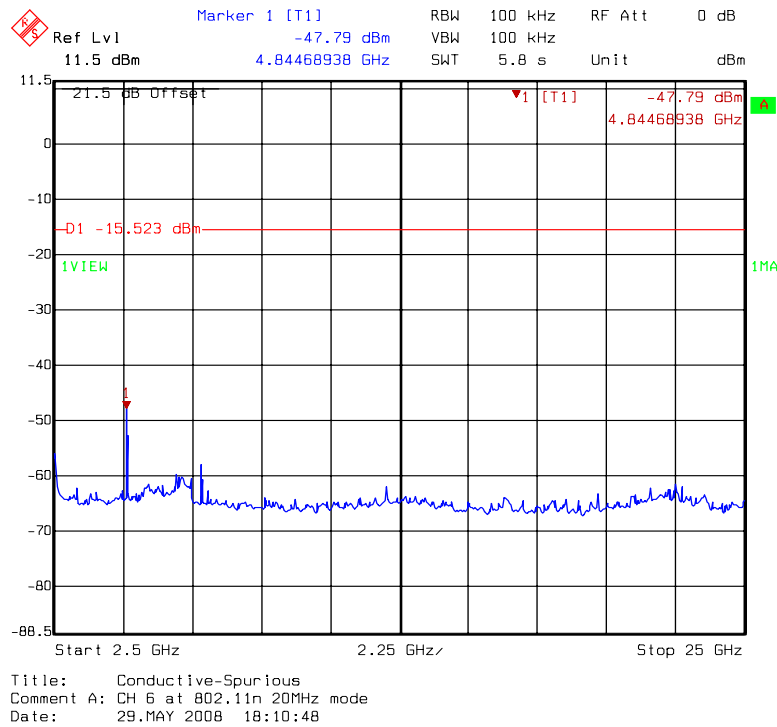
## conducted spurious @ draft 802.11n HT20 mode channel 6 (1of 3)



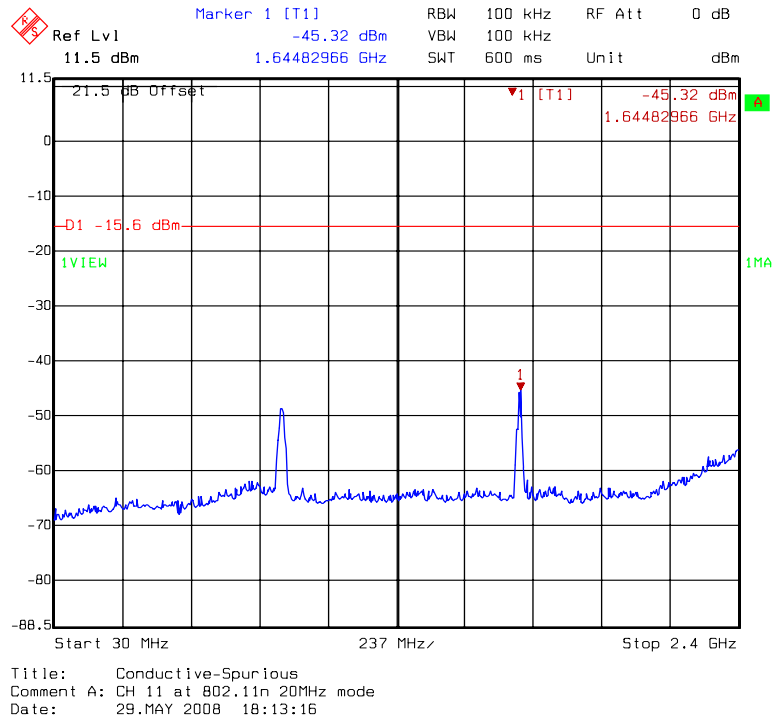
conducted spurious @ draft 802.11n HT20 mode channel 6 (2of 3)



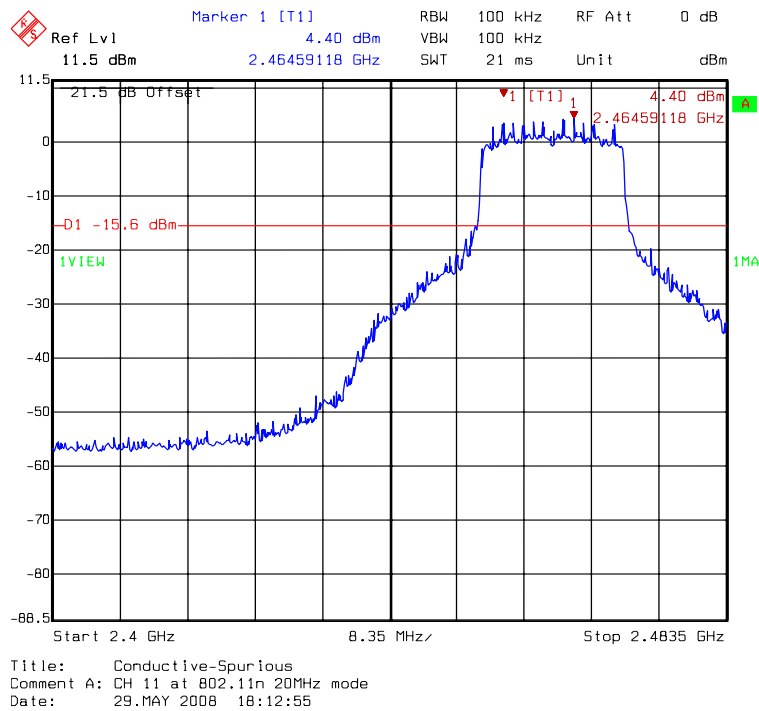
conducted spurious @ draft 802.11n HT20 mode channel 6 (3of 3)



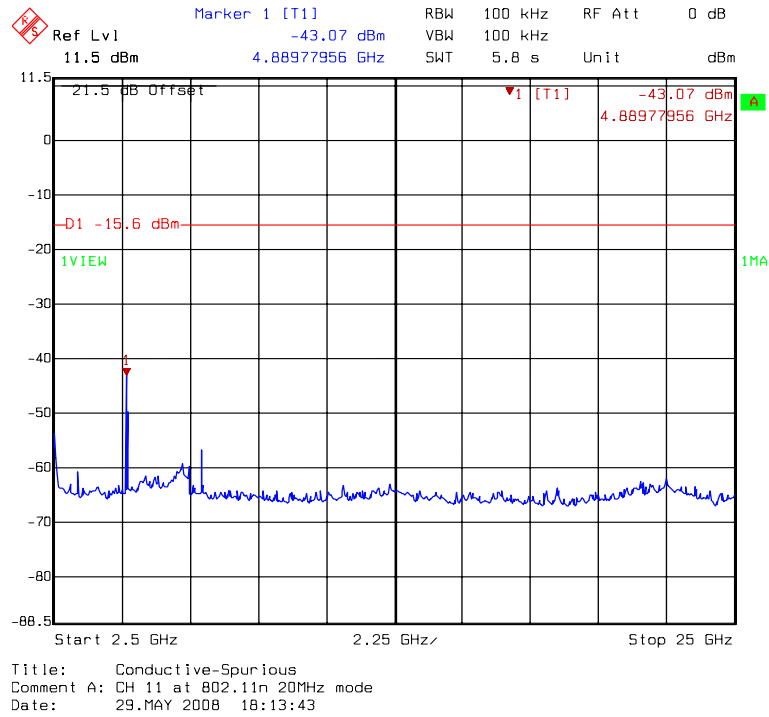
### conducted spurious @ draft 802.11n HT20 mode channel 11 (1of 3)



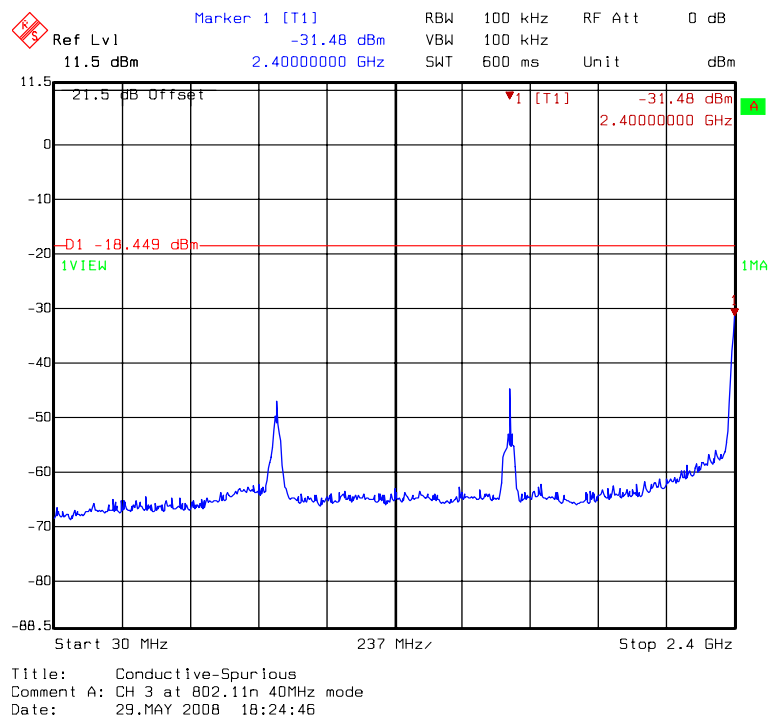
### conducted spurious @ draft 802.11n HT20 mode channel 11 (2of 3)



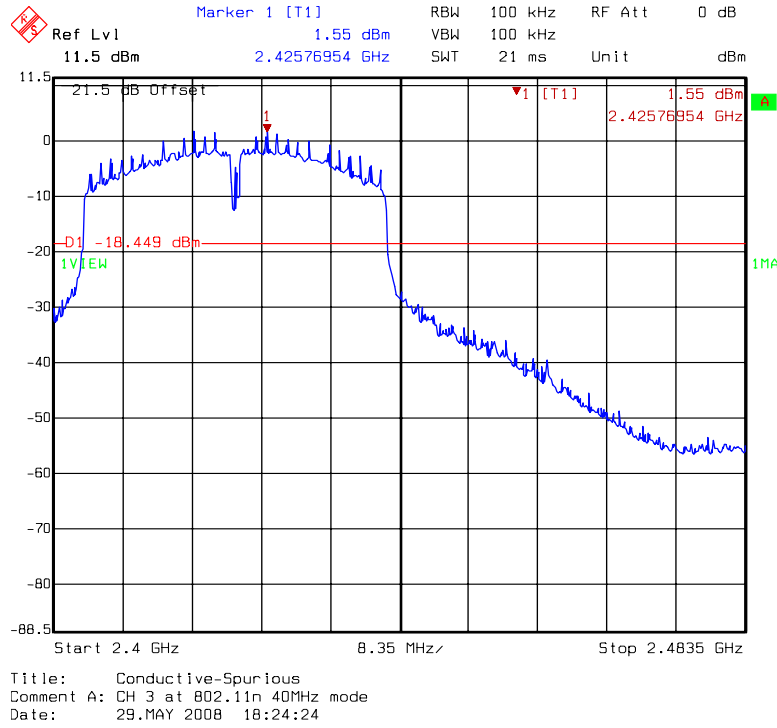
conducted spurious @ draft 802.11n HT20 mode channel 11 (3of 3)



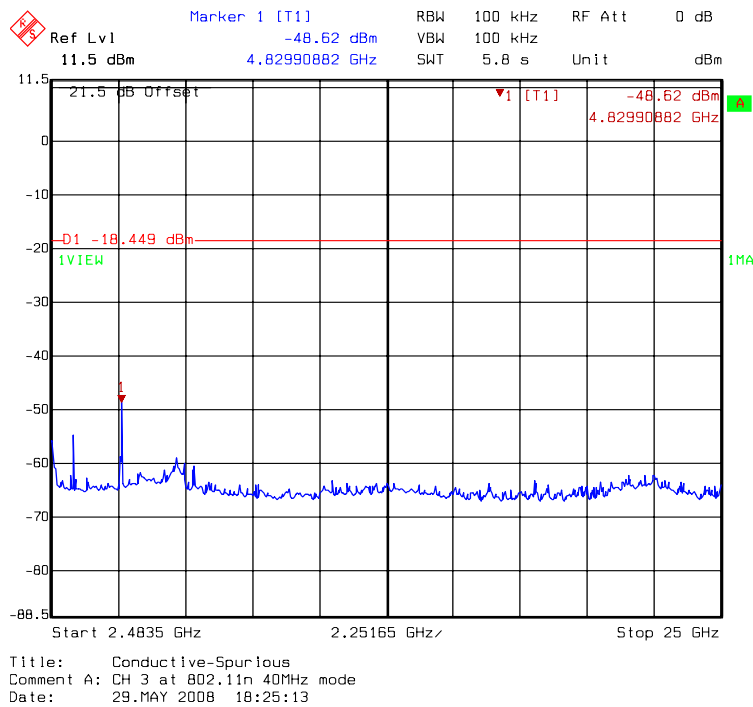
conducted spurious @ draft 802.11n HT40 mode channel 3 (1of 3)



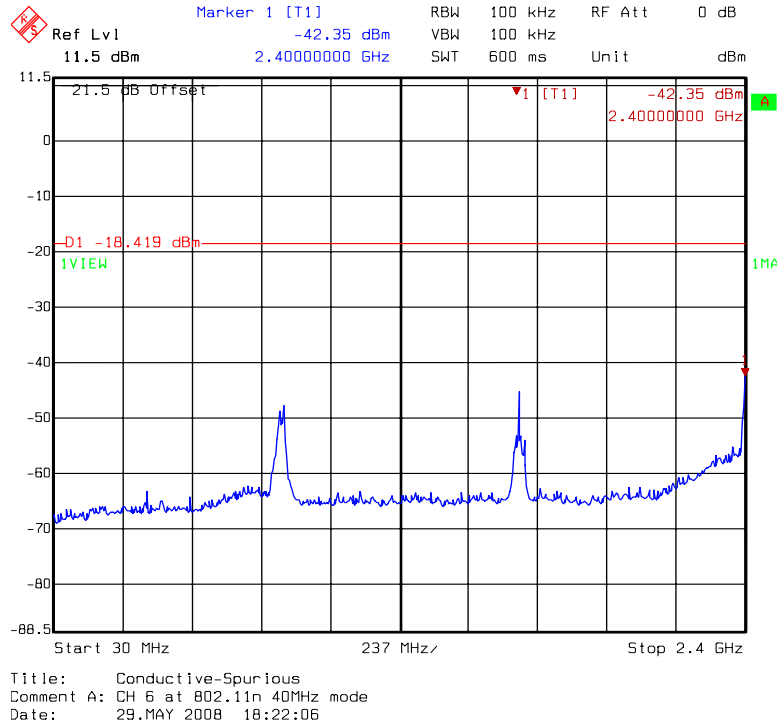
conducted spurious @ draft 802.11n HT40 mode channel 3 (2of 3)



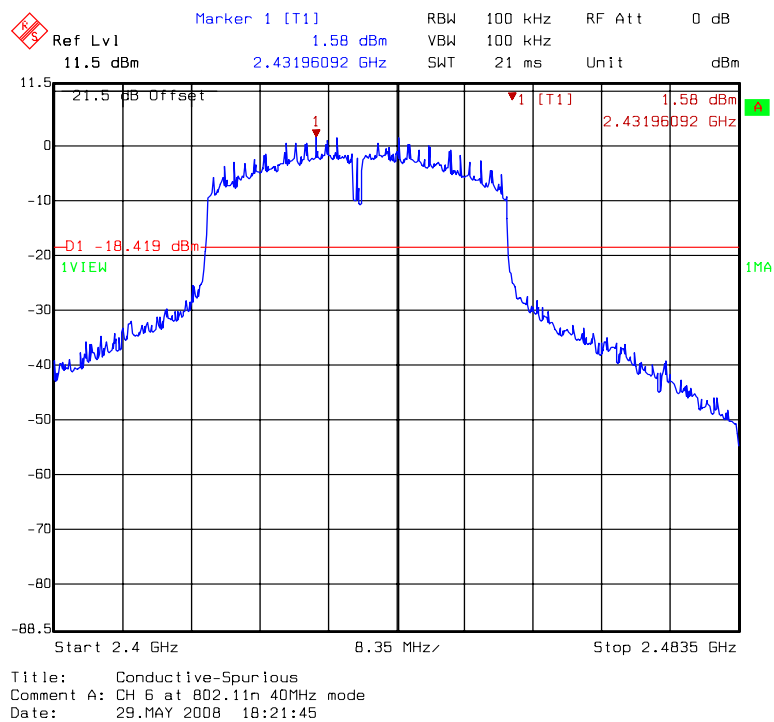
conducted spurious @ draft 802.11n HT40 mode channel 3 (3of 3)



conducted spurious @ draft 802.11n HT40 mode channel 6 (1of 3)

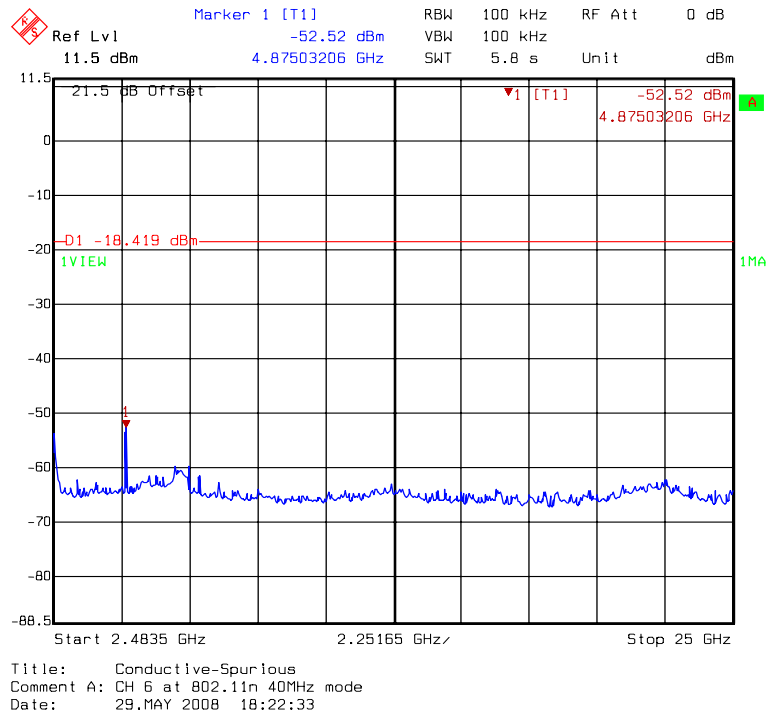


conducted spurious @ draft 802.11n HT40 mode channel 6 (2of 3)

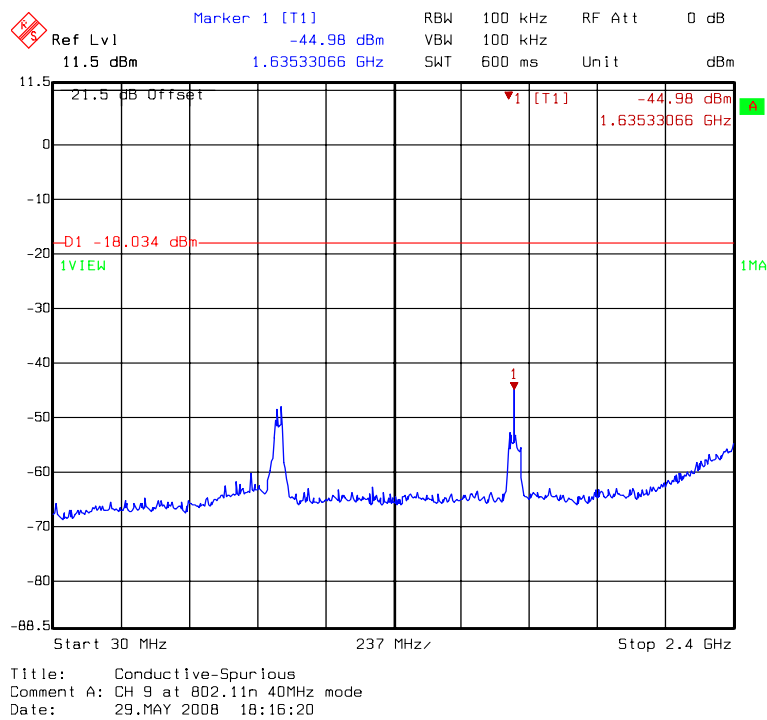




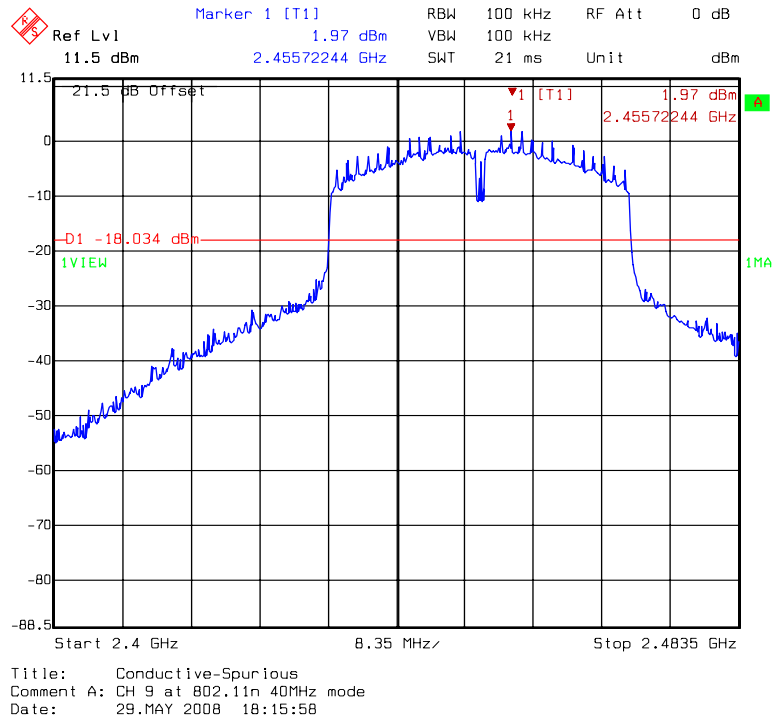
## conducted spurious @ draft 802.11n HT40 mode channel 6 (3of 3)



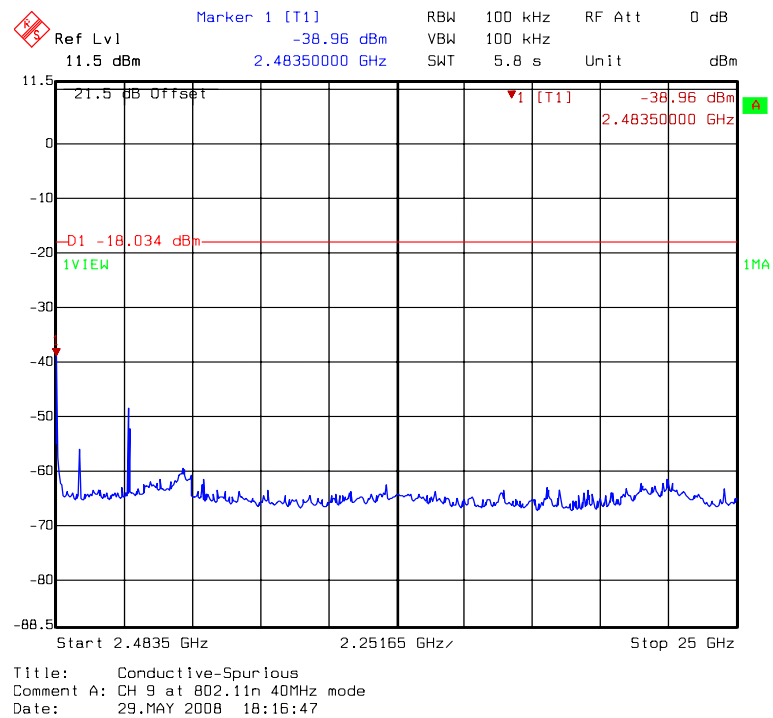
## conducted spurious @ draft 802.11n HT40 mode channel 9 (1of 3)



conducted spurious @ draft 802.11n HT40 mode channel 9 (2of 3)



conducted spurious @ draft 802.11n HT40 mode channel 9 (3of 3)



## 8. Radiated Spurious Emission

<b>Name of Test</b>	Radiated Spurious Emission
<b>Base Standard</b>	FCC 15.247(d), 15.209, 15.205

**Tested By:** Rex Liao  
**Test Date:** May 29, 2008

**Test Equipment:** EC1365

**Test Result:** Complies  
**Test Method:** See Appendix D  
**Measurement Data:** See Tables below

**Note:** (1) The EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle and high channel.  
(2) The EUT operating at 2.4GHz ISM band. Frequency Range scanned from 30MHz to 25GHz.

**Measurement results: frequencies equal to or less than 1 GHz**

The test was performed on EUT under 802.11b, 802.11g and 802.11n continuously transmitting mode. The worst case occurred at 802.11b Tx channel 1.

EUT : XN-721AI  
 Worst Case : 802.11b Tx at channel 1

Antenna Polariz. (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
V	399.570	QP	16.40	17.02	33.42	46.00	-12.58
V	480.080	QP	18.43	16.39	34.82	46.00	-11.19
V	563.500	QP	19.53	9.45	28.98	46.00	-17.02
V	719.670	QP	22.29	17.25	39.54	46.00	-6.47
V	749.740	QP	22.74	10.26	33.00	46.00	-13.00
V	804.060	QP	23.29	10.40	33.69	46.00	-12.31
H	239.520	QP	11.74	28.00	39.74	46.00	-6.26
H	299.660	QP	14.17	16.38	30.55	46.00	-15.46
H	399.570	QP	16.74	15.30	32.04	46.00	-13.96
H	565.440	QP	19.72	9.92	29.64	46.00	-16.36
H	719.670	QP	22.44	18.07	40.51	46.00	-5.49
H	799.210	QP	23.52	13.95	37.47	46.00	-8.53

**Remark:**

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

**Measurement results: frequency above 1GHz**

EUT : XN-721AI  
Test : 802.11b Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4824.00	PK	V	36.07	37.77	41.3	43	54	-11.00
4824.00	PK	H	36.07	37.77	37.57	39.27	54	-14.73

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the system noise floor.

EUT : XN-721AI  
Test : 802.11b Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4874.00	PK	V	36.07	37.77	42.26	43.96	54	-10.04
4874.00	PK	H	36.07	37.77	39.26	40.96	54	-13.04

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the system noise floor.

EUT : XN-721AI  
Test : 802.11b Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4924.00	PK	V	36.07	37.77	41.26	42.96	54	-11.04
4924.00	PK	H	36.07	37.77	38.85	40.55	54	-13.45

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the system noise floor.

EUT : XN-721AI  
Test : 802.11g Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4824.00	PK	V	36.07	37.77	38.97	40.67	54	-13.33
4824.00	PK	H	36.07	37.77	38.68	40.38	54	-13.62

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the system noise floor.

EUT : XN-721AI  
 Test : 802.11g Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4874.00	PK	V	36.07	37.77	41.69	43.39	54	-10.61
4874.00	PK	H	36.07	37.77	37.49	39.19	54	-14.81

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the system noise floor.

EUT : XN-721AI  
 Test : 802.11g Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4924.00	PK	V	36.07	37.77	39.21	40.91	54	-13.09
4924.00	PK	H	36.07	37.77	37.77	39.47	54	-14.53

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the system noise floor.

EUT : XN-721AI  
 Test : 802.11n HT20 Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4824.00	PK	V	36.07	37.77	38.68	40.38	54	-13.62
4824.00	PK	H	36.07	37.77	37.91	39.61	54	-14.39

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the system noise floor.

EUT : XN-721AI  
 Test : 802.11n HT20 Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4874.00	PK	V	36.07	37.77	40.33	42.03	54	-11.97
4874.00	PK	H	36.07	37.77	37.97	39.67	54	-14.33

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the system noise floor.



EUT : XN-721AI  
Test : 802.11n HT20 Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4924.00	PK	V	36.07	37.77	41.05	42.75	54	-11.25
4924.00	PK	H	36.07	37.77	37.44	39.14	54	-14.86

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the system noise floor.

EUT : XN-721AI  
Test : 802.11n HT40 Tx at channel 3

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4844.00	PK	V	36.07	37.77	38.62	40.32	54	-13.68
4844.00	PK	H	36.07	37.77	37.98	39.68	54	-14.32

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the system noise floor.

EUT : XN-721AI  
Test : 802.11n HT40 Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4874.00	PK	V	36.07	37.77	39.82	41.52	54	-12.48
4874.00	PK	H	36.07	37.77	36.91	38.61	54	-15.39

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the system noise floor.

EUT : XN-721AI  
Test : 802.11n HT40 Tx at channel 9

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4904.00	PK	V	36.07	37.77	38.81	40.51	54	-13.49
4904.00	PK	H	36.07	37.77	38.21	39.91	54	-14.09

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the system noise floor.

## 9. Emission on Band Edge

<b>Name of Test</b>	Emission Band Edge
<b>Base Standard</b>	FCC 15.247(d)

**Tested By:** Rex Liao  
**Test Date:** May 29, 2008

**Test Equipment:** EC1365

**Test Result:** Complies  
**Test Method:** See Appendix D  
**Measurement Data:** See Tables & plots below

**Note:** The EUT was tested while in a continuous transmit mode and tuned to lowest and highest channels.

**Test Mode: 802.11b**

Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	56.88	74	-17.12
		AV	45.38	54	-8.62
11 (highest)	2483.5-2500	PK	56.93	74	-17.07
		AV	45.78	54	-8.22

**Test Mode: 802.11g**

Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	65.76	74	-8.24
		AV	48.87	54	-5.13
11 (highest)	2483.5-2500	PK	70.97	74	-3.03
		AV	52.61	54	-1.39

**Test Mode: 802.11n HT20**

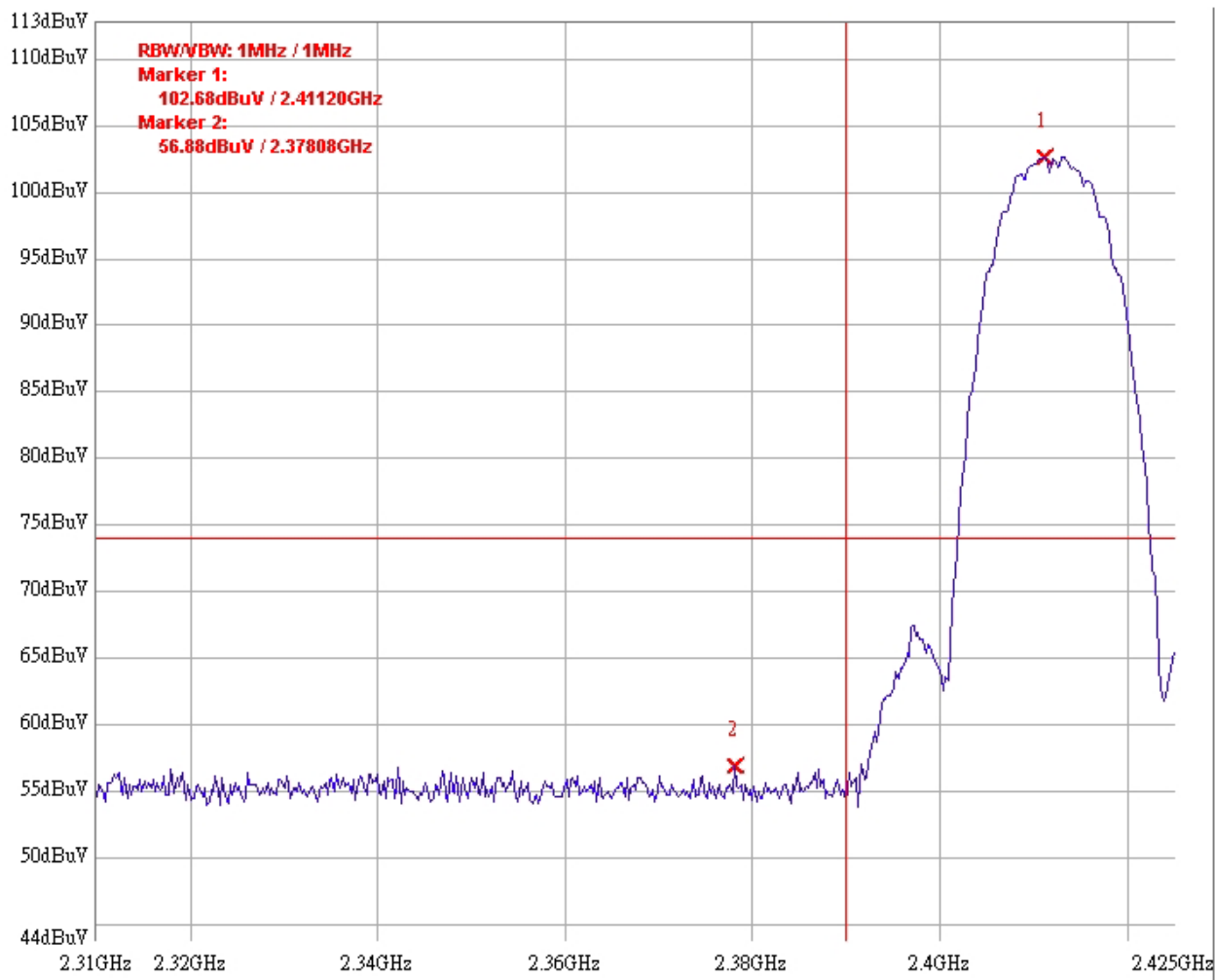
Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	70.10	74	-3.90
		AV	51.59	54	-2.41
11 (highest)	2483.5-2500	PK	71.16	74	-2.84
		AV	52.82	54	-1.18

**Test Mode: 802.11n HT40**

Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
3 (lowest)	2310-2390	PK	65.62	74	-8.38
		AV	52.06	54	-1.94
9 (highest)	2483.5-2500	PK	63.44	74	-10.56
		AV	52.87	54	-1.13

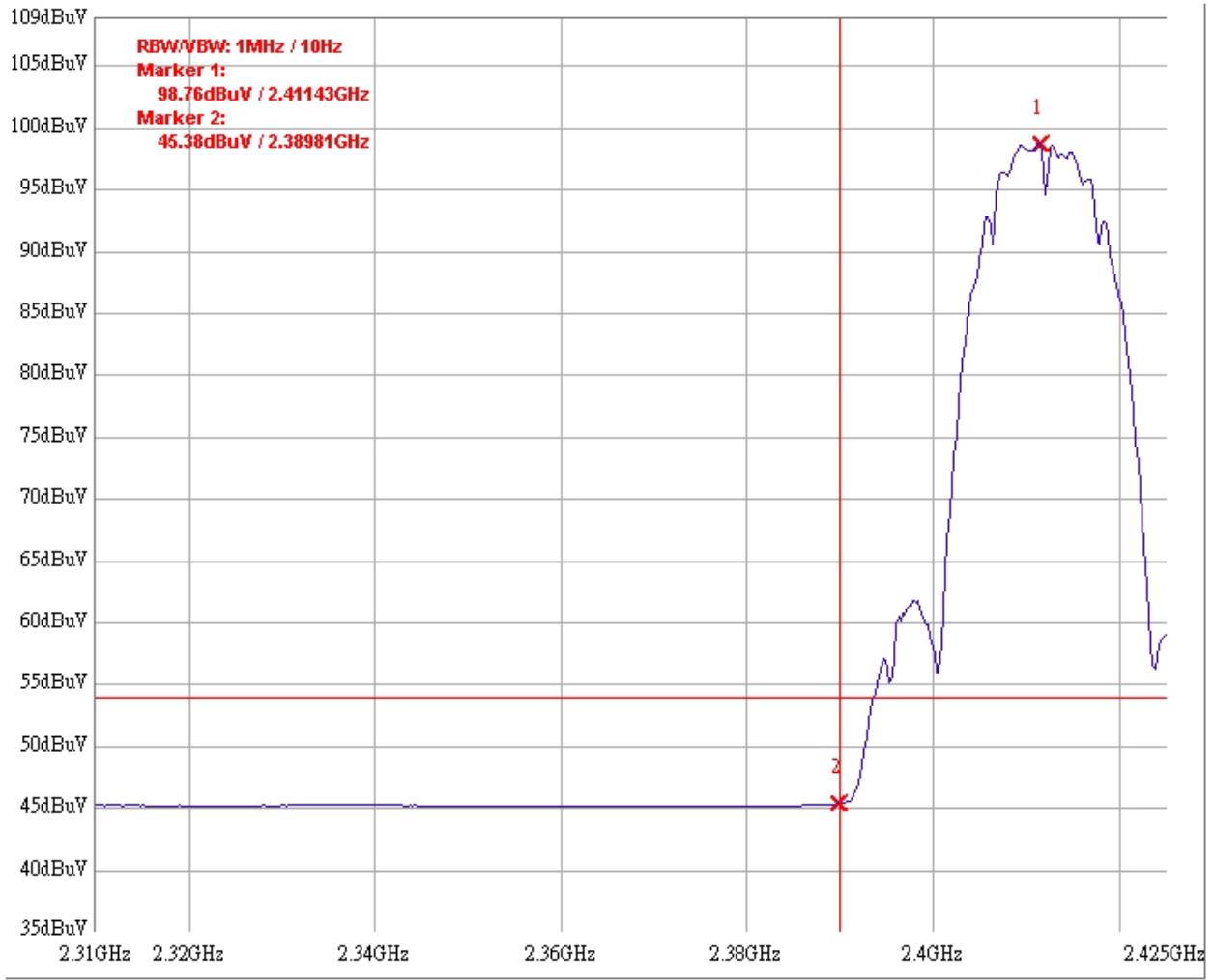
### Dual Tx

Bandage @ 802.11b mode channel 1 (PK)



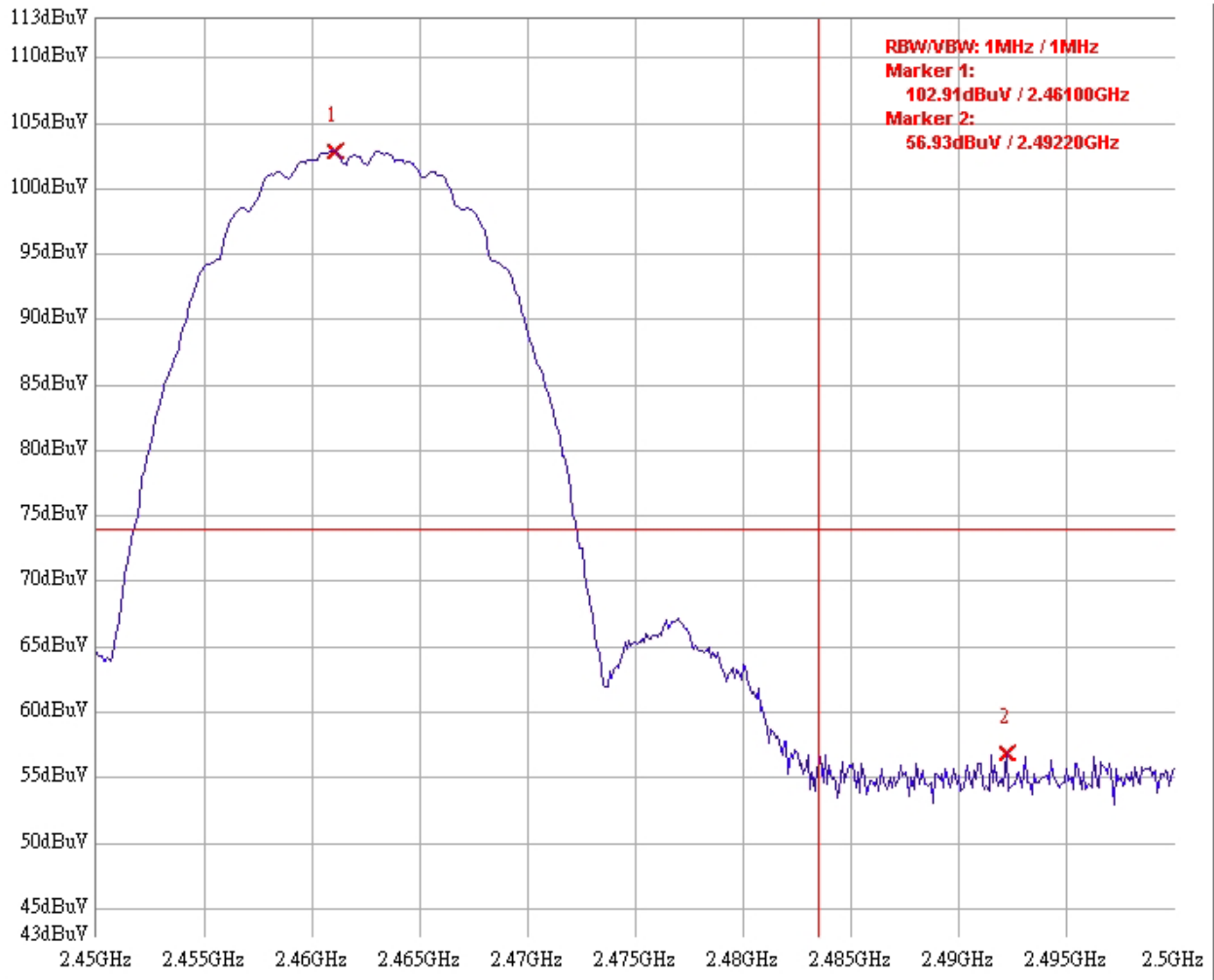
bandedge  
11b chl  
PK

## Dual: Bandage @ 802.11b mode channel 1 (AV)



bandedge  
11b chl  
AV

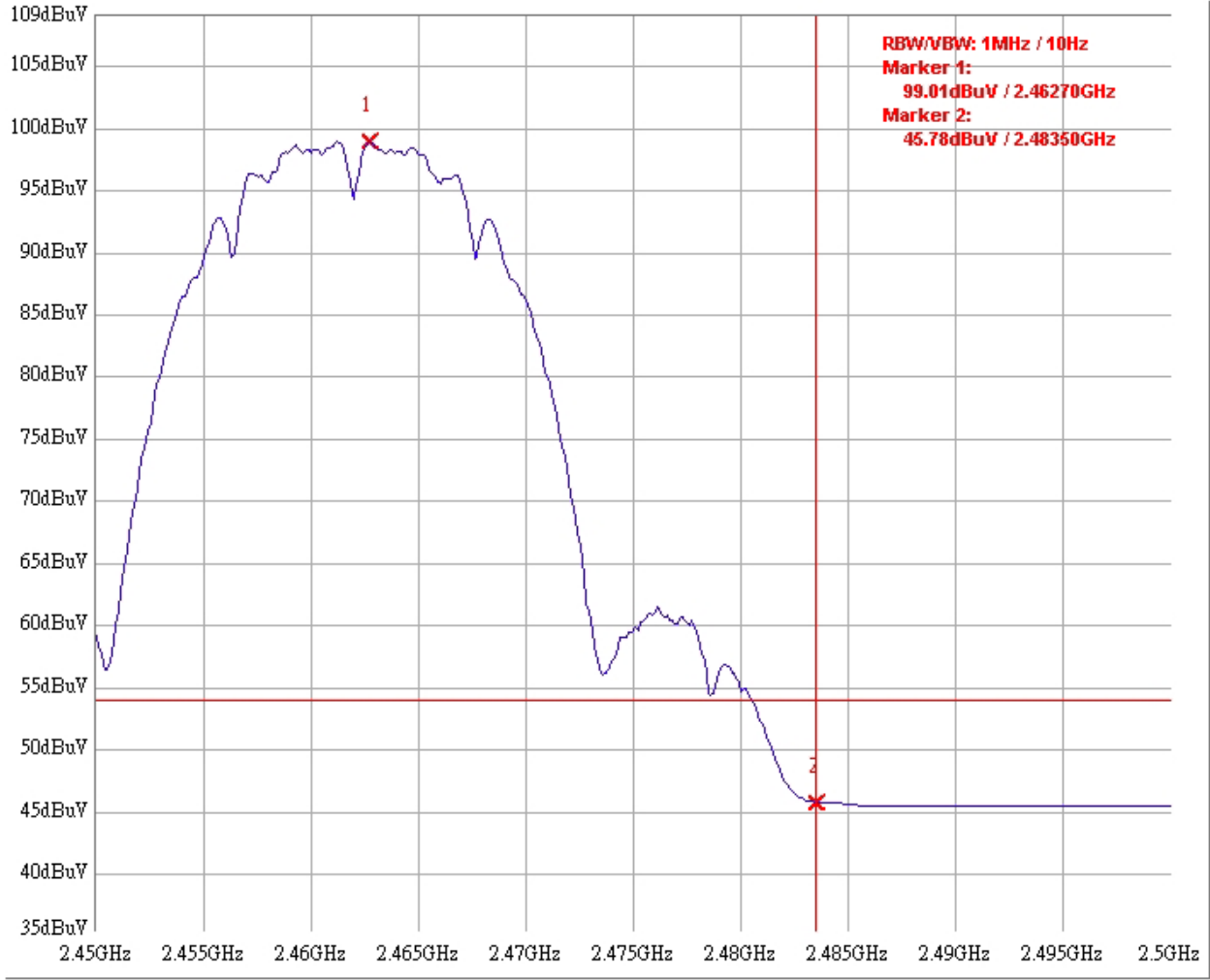
Bandage @ 802.11b mode channel 11 (PK)



bandedge  
11b ch11  
PK

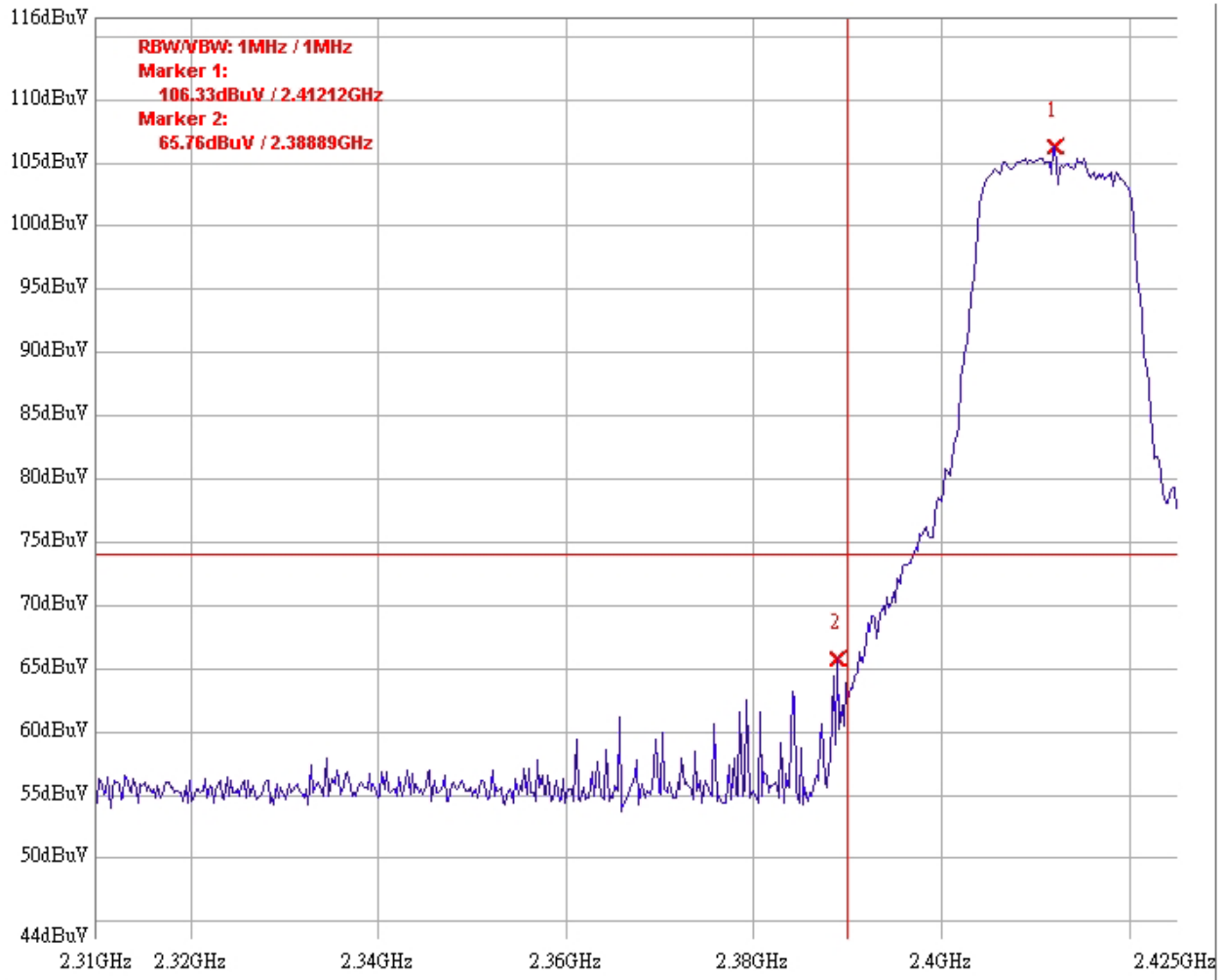


Bandage @ 802.11b mode channel 11 (AV)



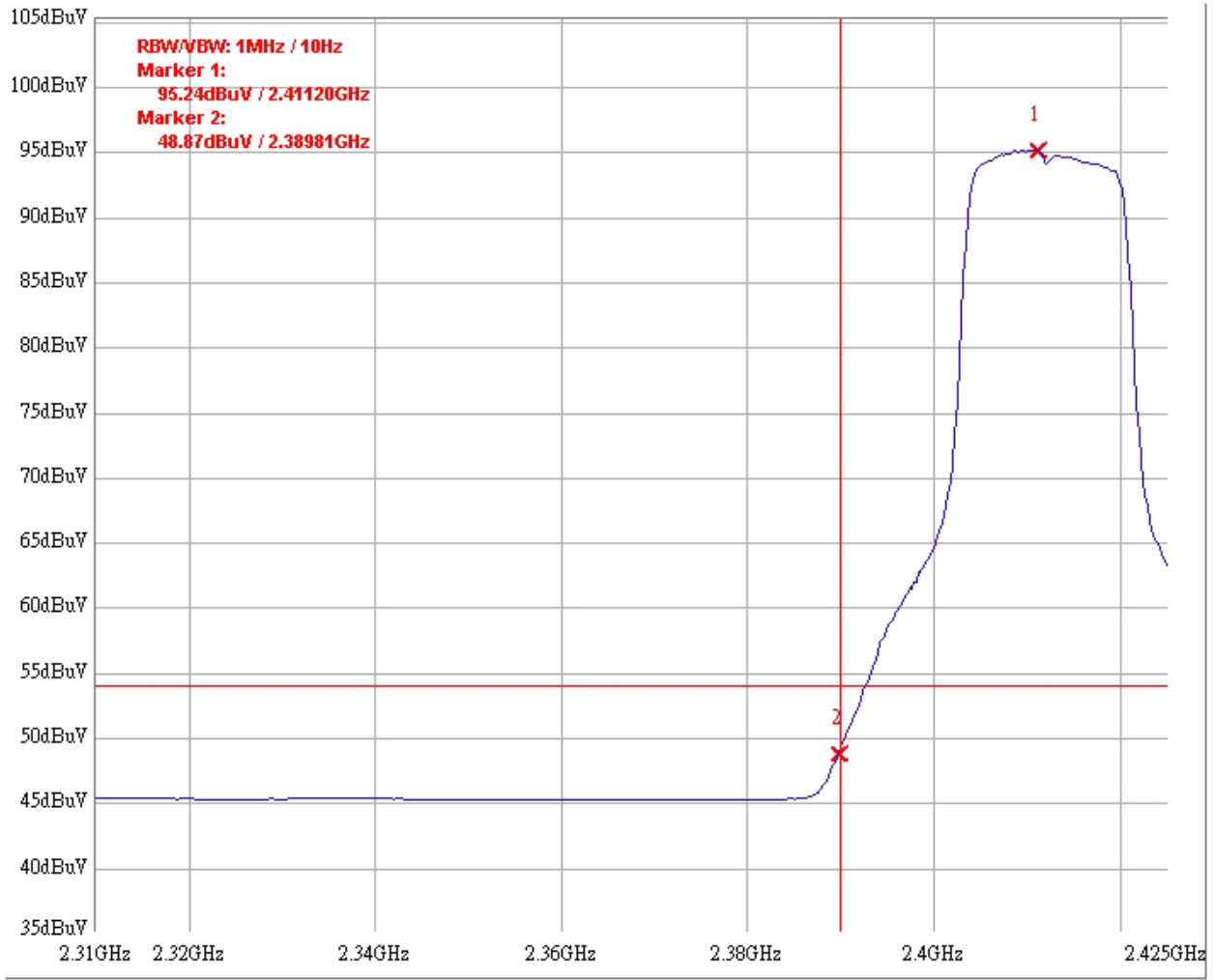
bandedge  
11b ch11  
AV

## Bandage @ 802.11g mode channel 1 (PK)



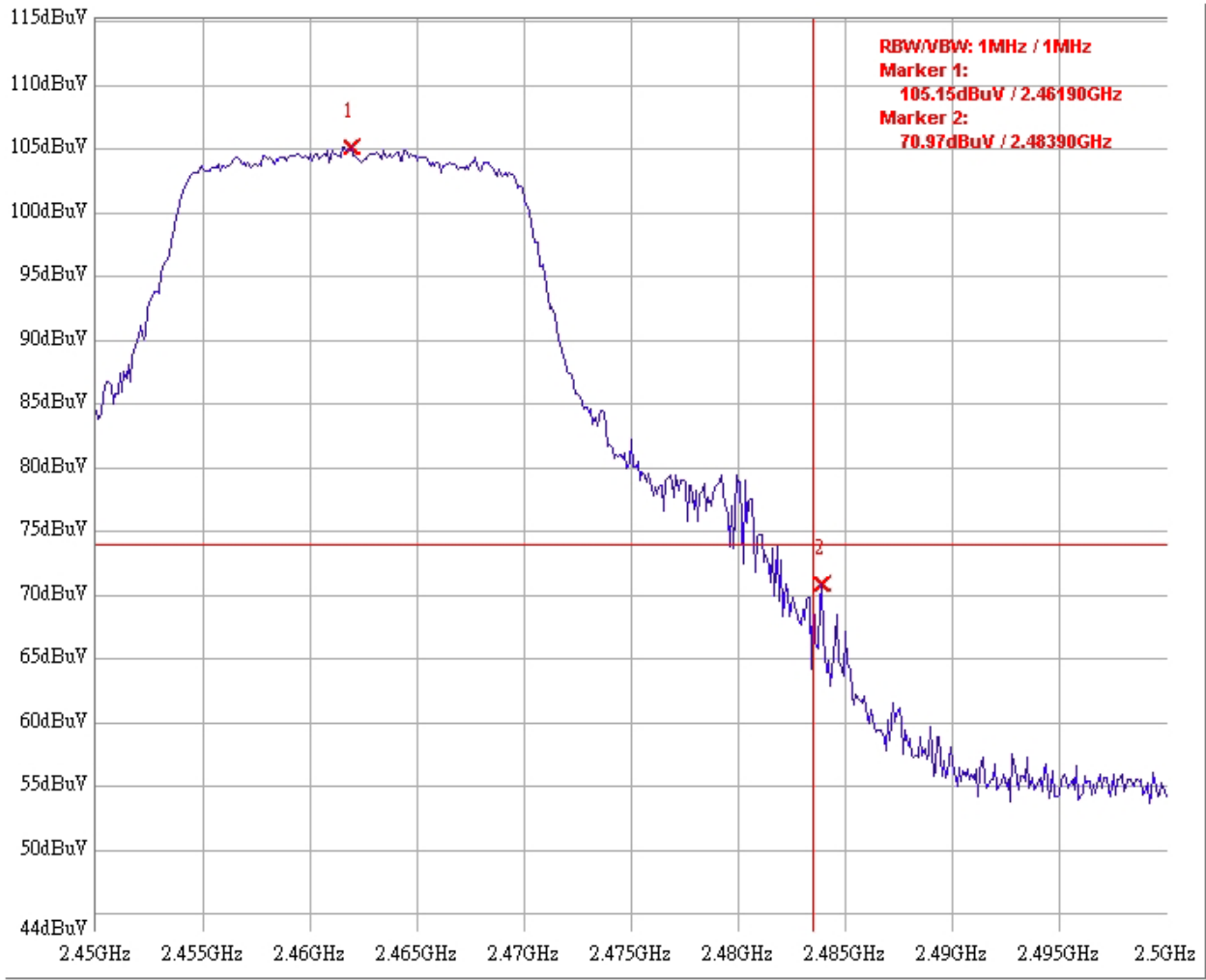
bandedge  
11g chl  
PK

## Bandage @ 802.11g mode channel 1 (AV)



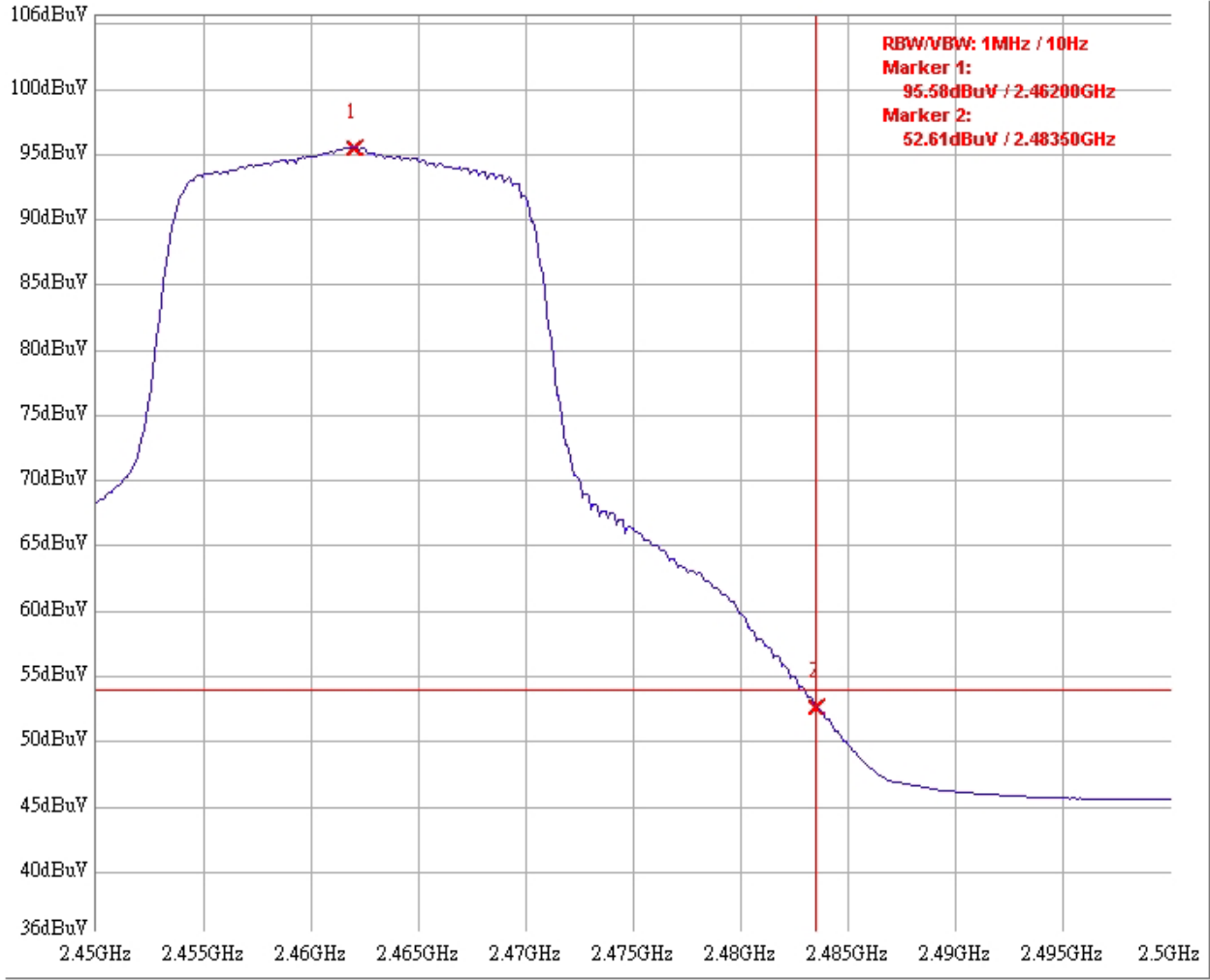
bandedge  
11g chl  
AV

Bandage @ 802.11g mode channel 11 (PK)



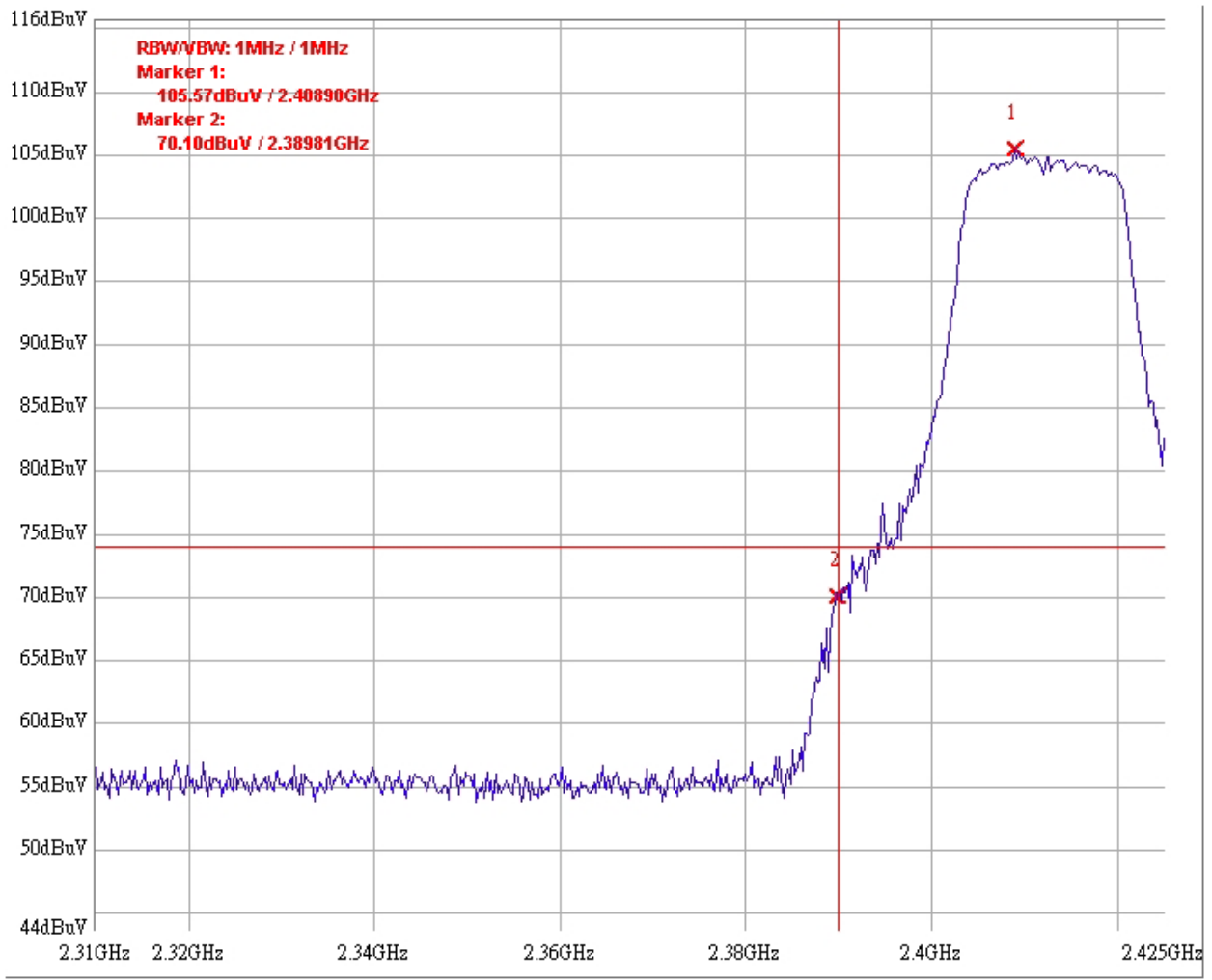
bandedge  
11g ch11  
PK

Bandage @ 802.11g mode channel 11 (AV)



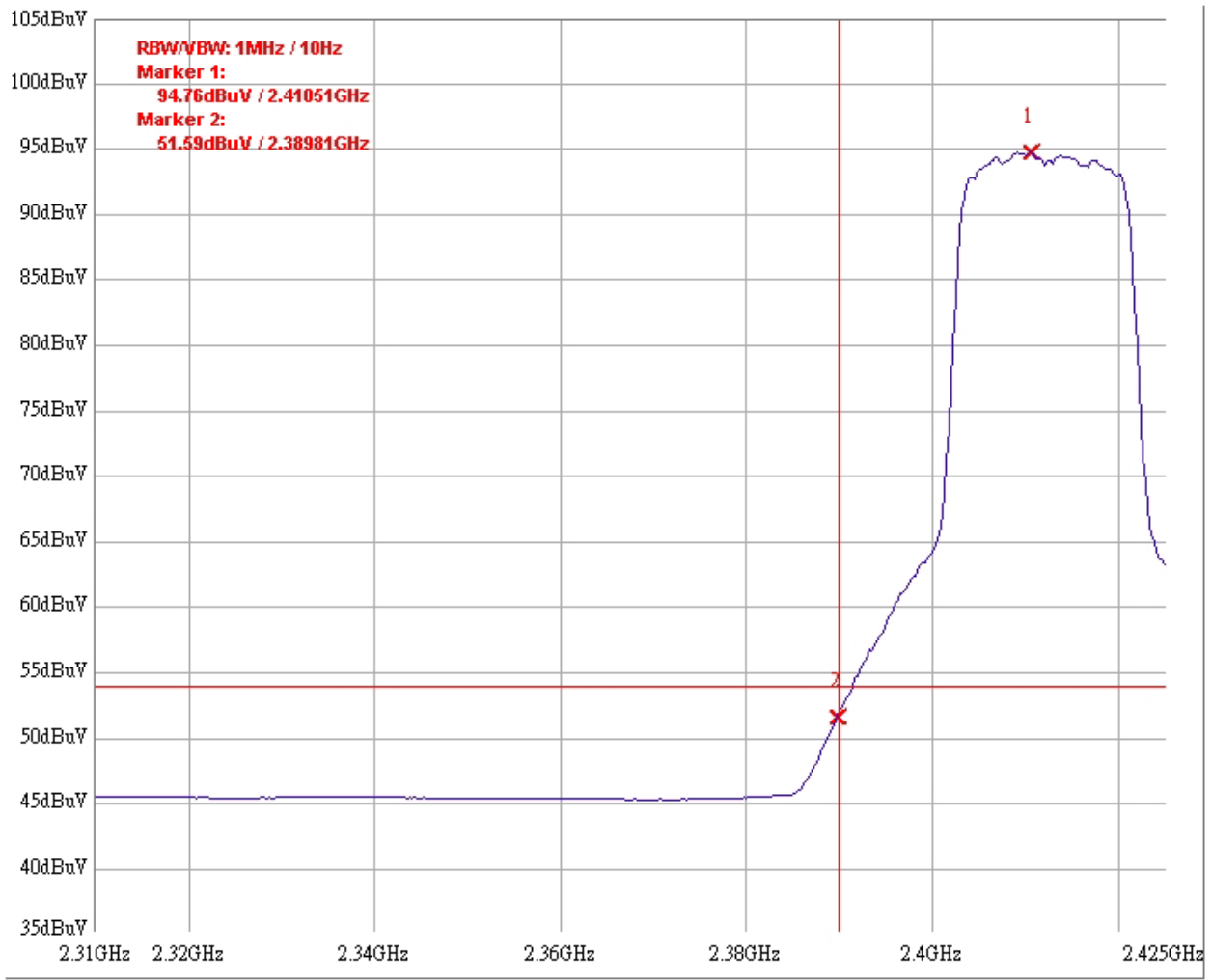
bandedge  
11g ch11  
AV

## Bandage @ 802.11n HT20 mode channel 1 (PK)



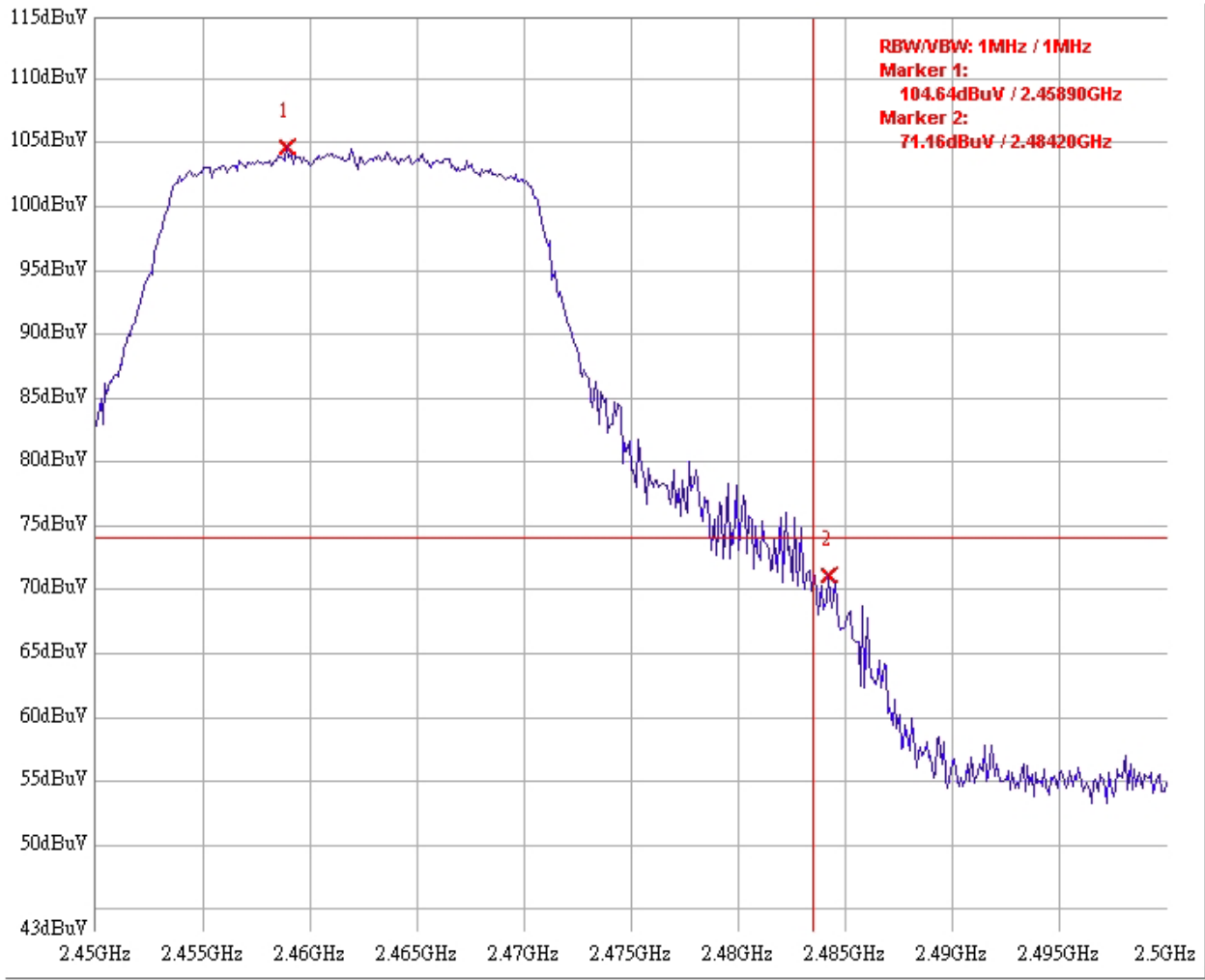
bandedge  
11n(20) ch1  
PK

## Bandage @ 802.11n HT20 mode channel 1 (AV)



bandedge  
11n(20) ch1  
AV

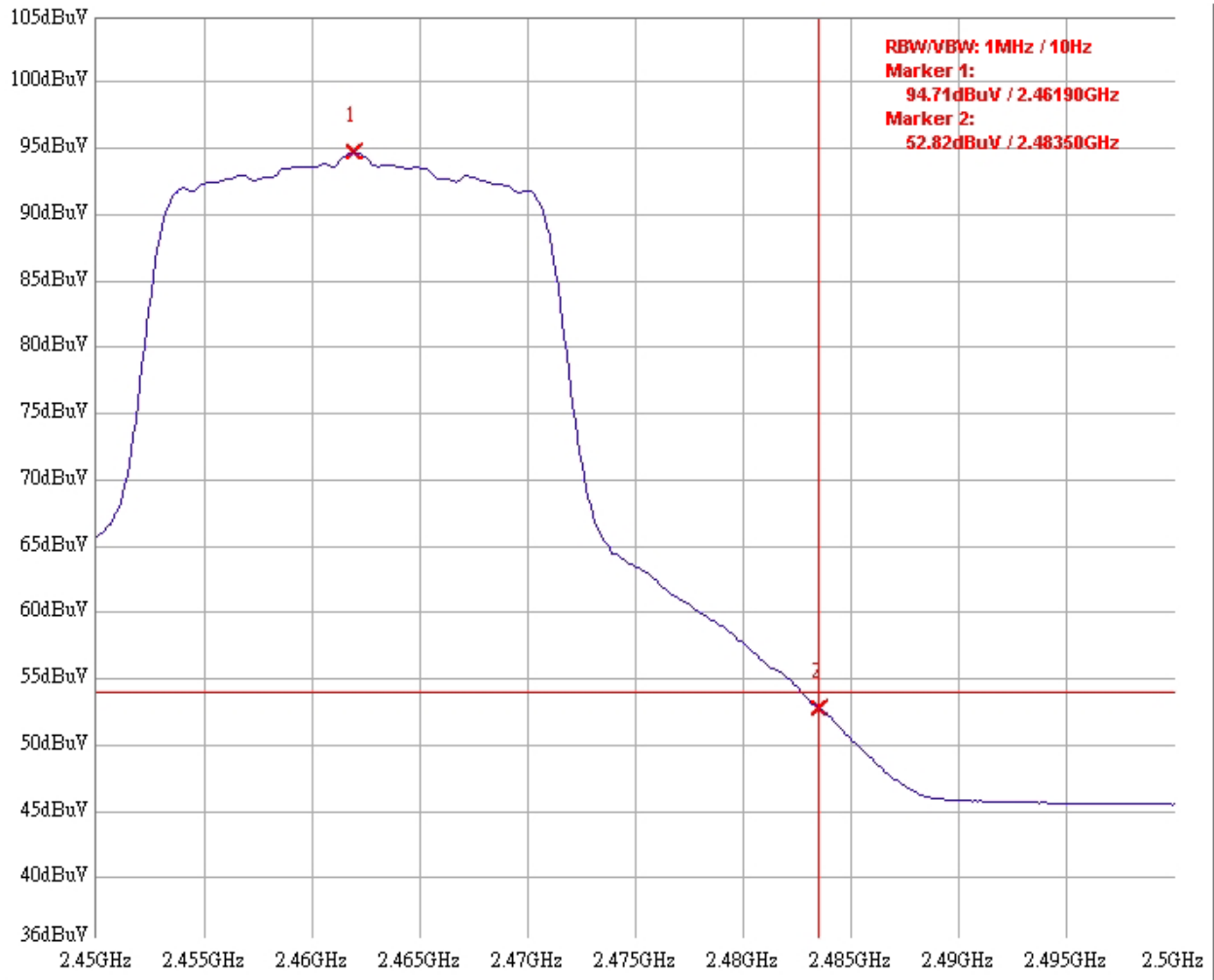
Bandage @ 802.11n HT20 mode channel 11 (PK)



bandedge  
11n(20) ch11  
PK

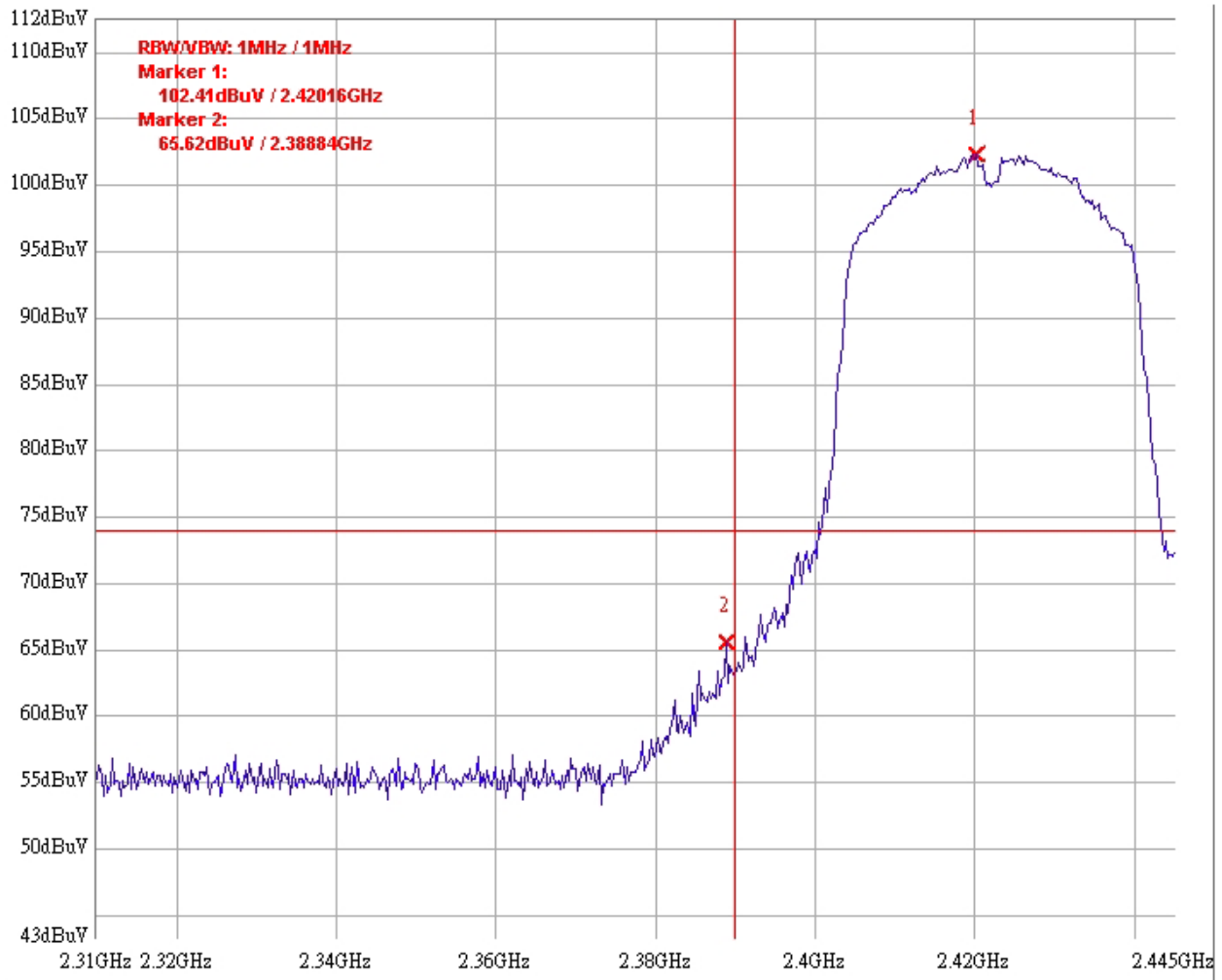


## Bandage @ 802.11n HT20 mode channel 11 (AV)



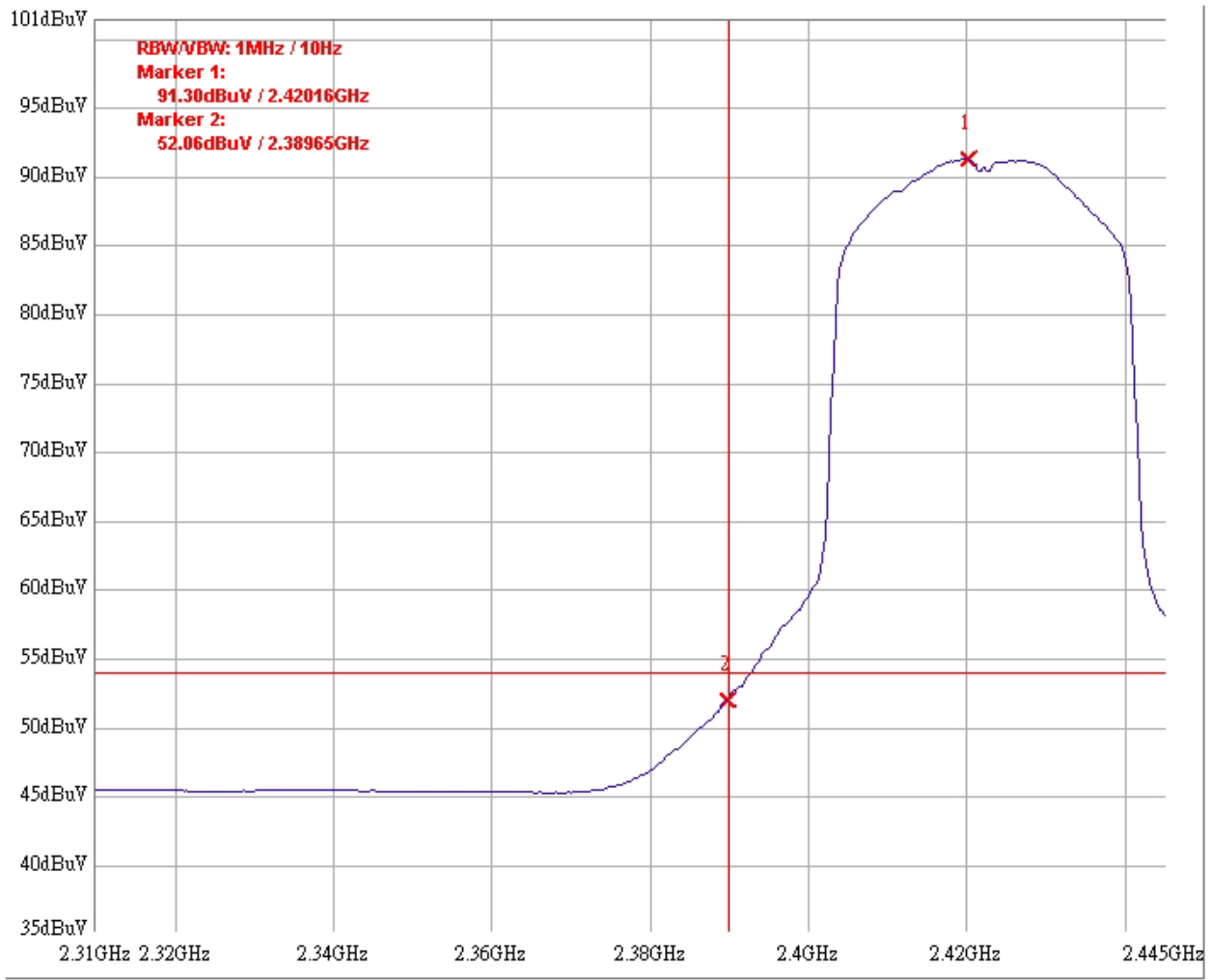
bandedge  
11n(20) ch11  
PK

Bandage @ 802.11n HT40 mode channel 3 (PK)



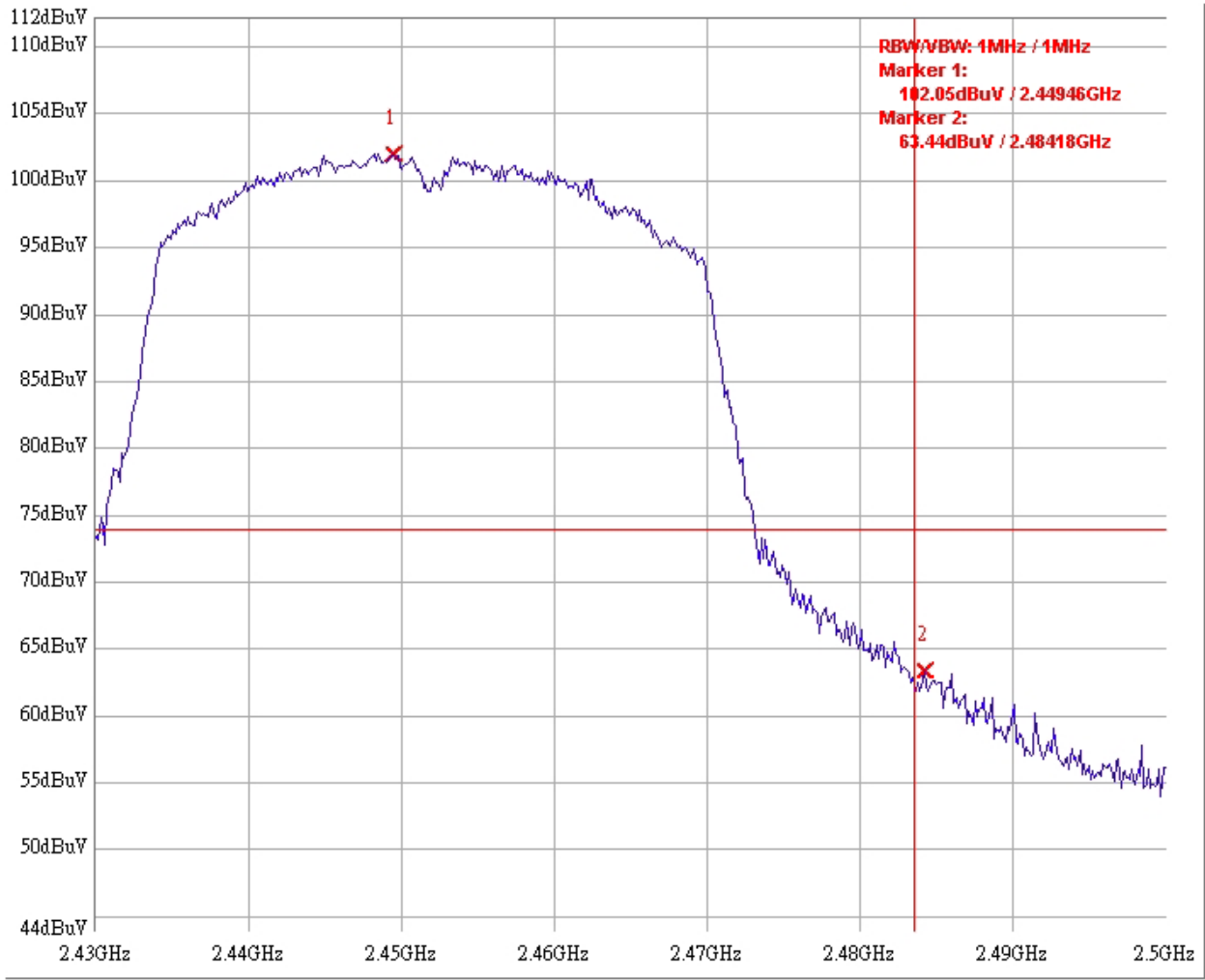
bandedge  
11n(40) ch3  
PK

Bandage @ 802.11n HT40 mode channel 3 (AV)



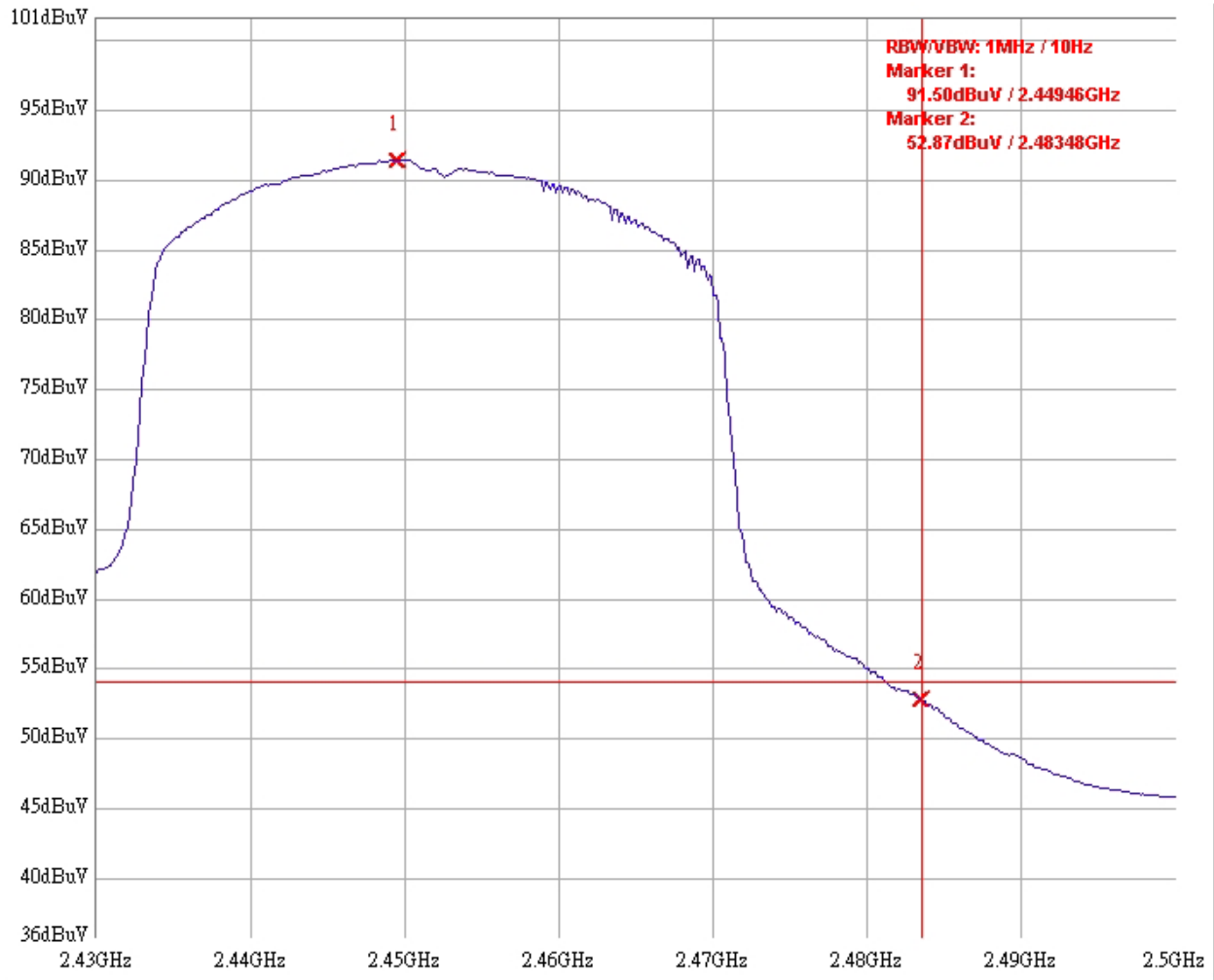
bandedge  
11n(40) ch3  
AV

Bandage @ 802.11n HT40 mode channel 9 (PK)



bandedge  
11n(40) ch9  
PK

Bandage @ 802.11n HT40 mode channel 9 (AV)



bandaged  
11n(40) ch9  
AV

## 10. AC power line conducted emission

<b>Name of Test</b>	AC power line conducted emission
<b>Base Standard</b>	FCC 15.207

**Tested By:** Rex Liao  
**Test Date:** May 27, 2008

**Test Equipment:** EC1365

**Test Result:** Complies  
**Test Method:** See Appendix E  
**Measurement Data:** See Tables & plots below

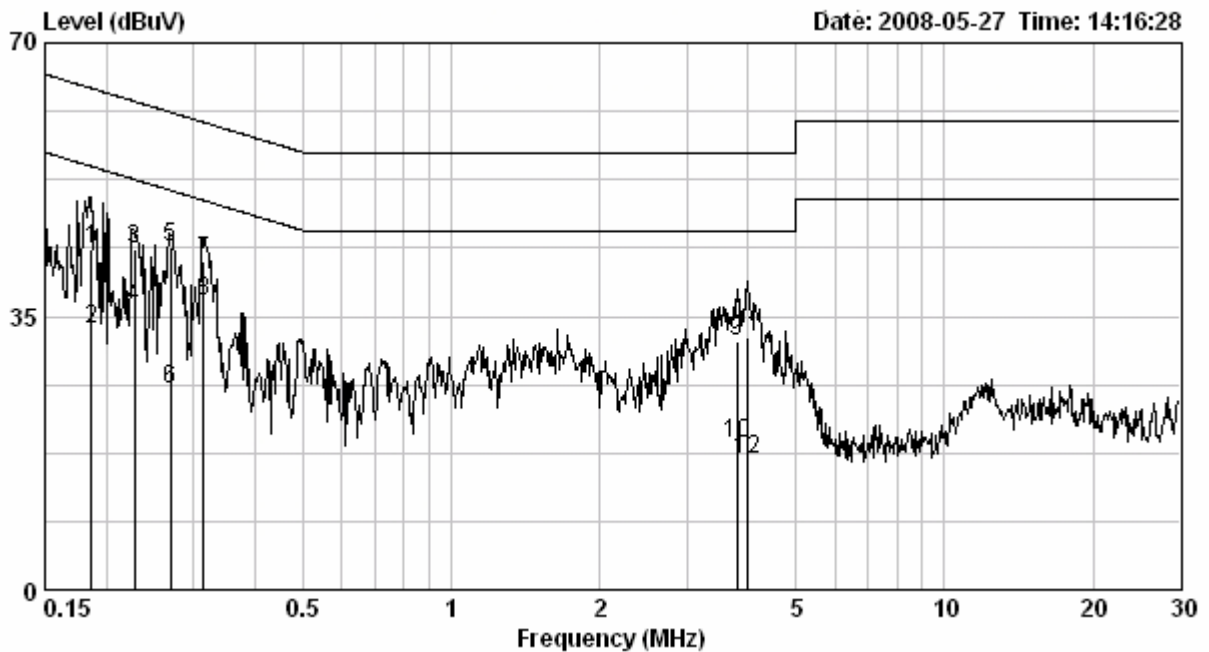
**Note:** The EUT was tested while in normal communication mode.

Phase : Line  
EUT : XN-721AI  
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.19	0.80	43.58	64.20	33.25	54.20	-20.62	-20.95
0.23	0.66	43.59	62.52	36.03	52.52	-18.93	-16.49
0.27	0.49	43.73	61.12	25.57	51.12	-17.38	-25.54
0.31	0.34	42.04	59.84	36.86	49.84	-17.80	-12.98
3.80	0.28	31.92	56.00	18.79	46.00	-24.08	-27.21
3.99	0.29	32.22	56.00	16.56	46.00	-23.78	-29.44

**Remark:**

1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)

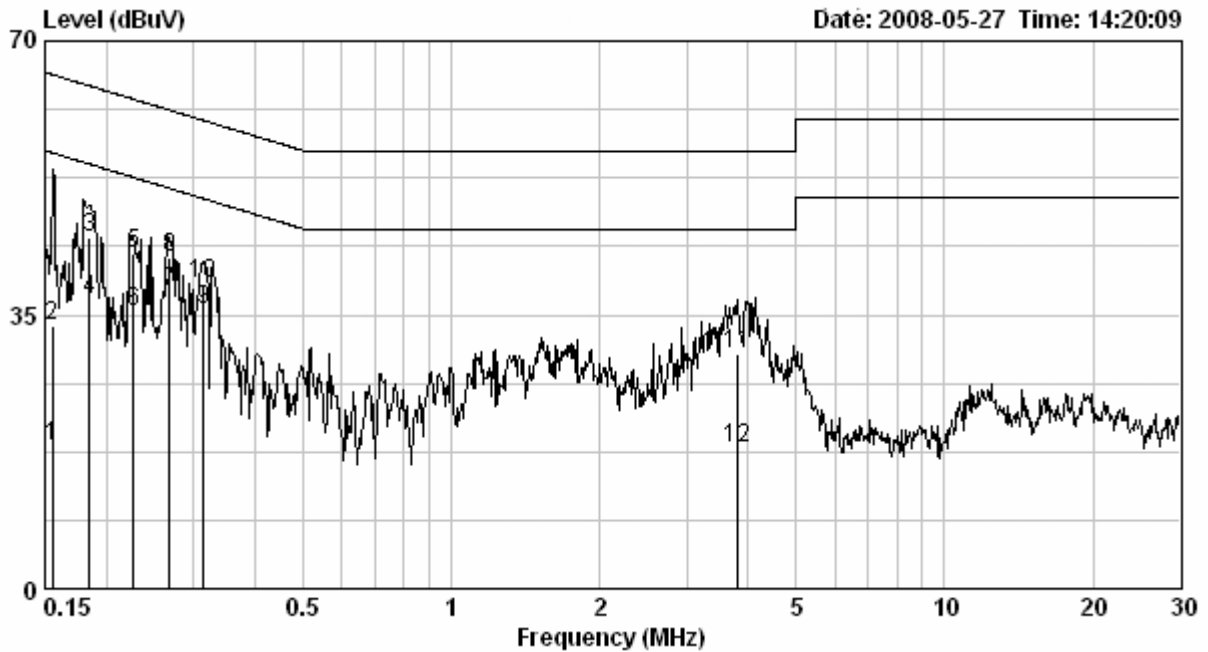


Phase : Neutral  
EUT : XN-721AI  
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.16	0.10	33.60	65.69	18.29	55.69	-32.09	-37.40
0.18	0.10	44.94	64.28	36.87	54.28	-19.34	-17.41
0.23	0.10	42.86	62.57	35.31	52.57	-19.71	-17.26
0.27	0.10	42.38	61.16	38.06	51.16	-18.78	-13.10
0.31	0.10	39.08	59.84	35.70	49.84	-20.76	-14.14
3.80	0.28	30.06	56.00	18.07	46.00	-25.94	-27.93

**Remark:**

1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)





## APPENDICES

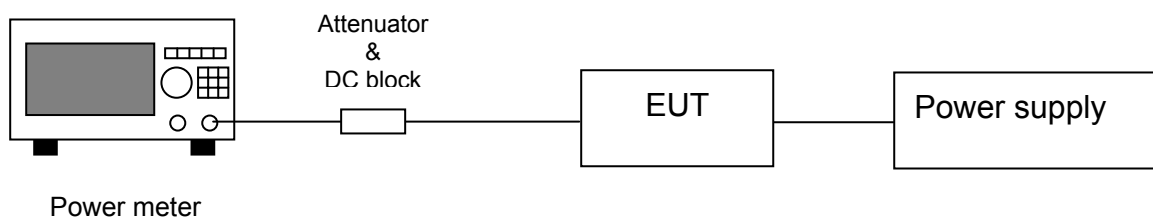
## Appendix A: 2.1046 - RF Power Output

### A1. Method of Measurement:

Reference FCC document: KDB558074

The peak power at antenna terminals is measured using a Power Meter. Power output is measured with the maximum rated input level.

### A2. Test Diagram:



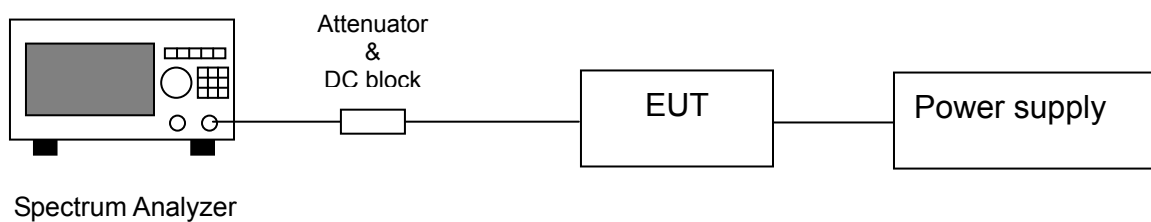
## Appendix B: 2.1049 - Occupied Bandwidth

### B1. Method of Measurement:

Reference FCC document: KDB558074

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of at least 1% of the bandwidth of the transmitted signal. The resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform. The appropriate bandwidth mask is applied to the output waveform to verify compliance.

### B1. Test Diagram:



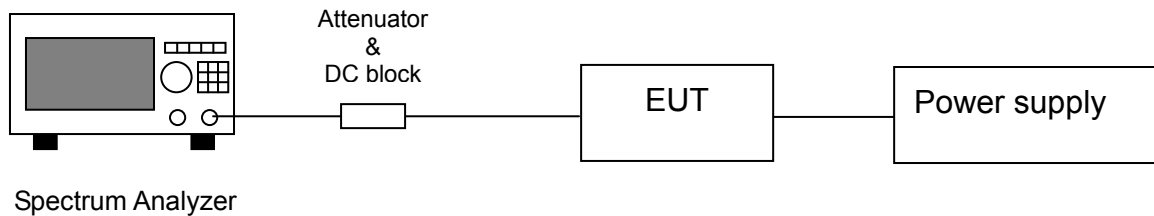
## Appendix C: 2.1051 - Spurious Emission at Antenna Terminal

### C1. Method of Measurement:

Reference FCC document: KDB558074

The measurements were performed from 30MHz to 25GHz RF antenna conducted per FCC 15.247 (d) was measured from the EUT antenna port using a 50ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz. Harmonics and spurious noise must be at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. The table below is the results from the highest emission for each channel within the authorized band. This table was used to determine the spurious limits for each channel.

### C2. Test Diagram:



## **Appendix D: 2.1053 – Field Strength of Spurious Radiation**

### **D1. Method of Measurement:**

#### **Reference FCC document: KDB558074, ANSI C63.4**

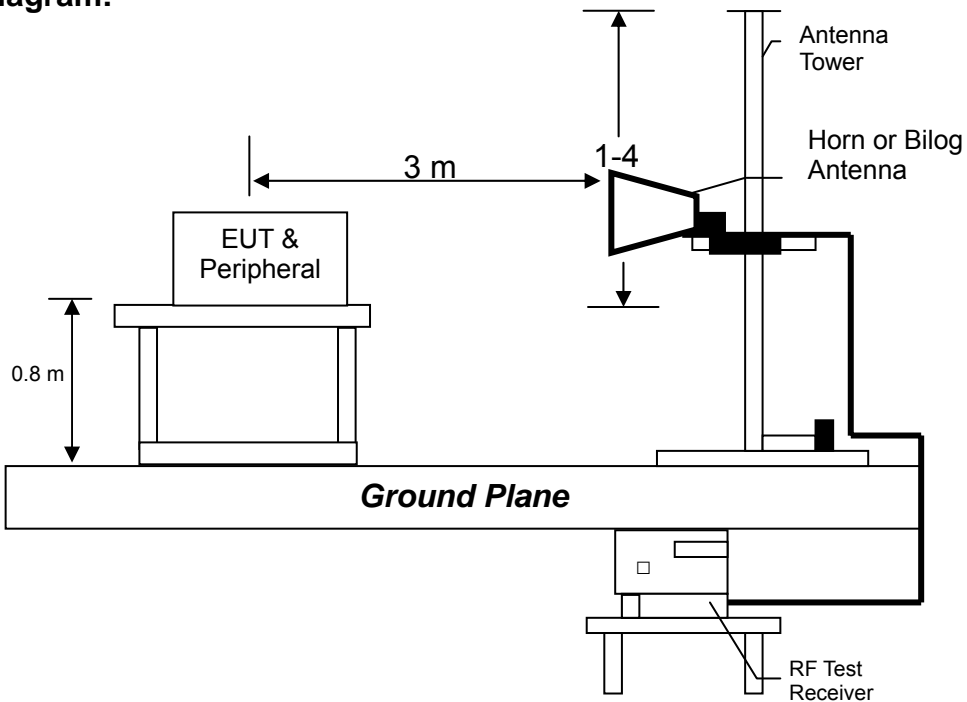
The frequency range from 30MHz to 1000MHz using Bilog Antenna.  
The frequency range over 1GHz using Horn Antenna.

Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter. The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent 3 meter reading using inverse scaling with distance.

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

**D2. Test Diagram:**



**D3. Emission Limit:**

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Limits (dBµV/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

**Remark:**

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

## Appendix E: 15.207 – AC power line conducted emission

### E1. Method of Measurement:

Reference FCC document: KDB558074, ANSI C63.4

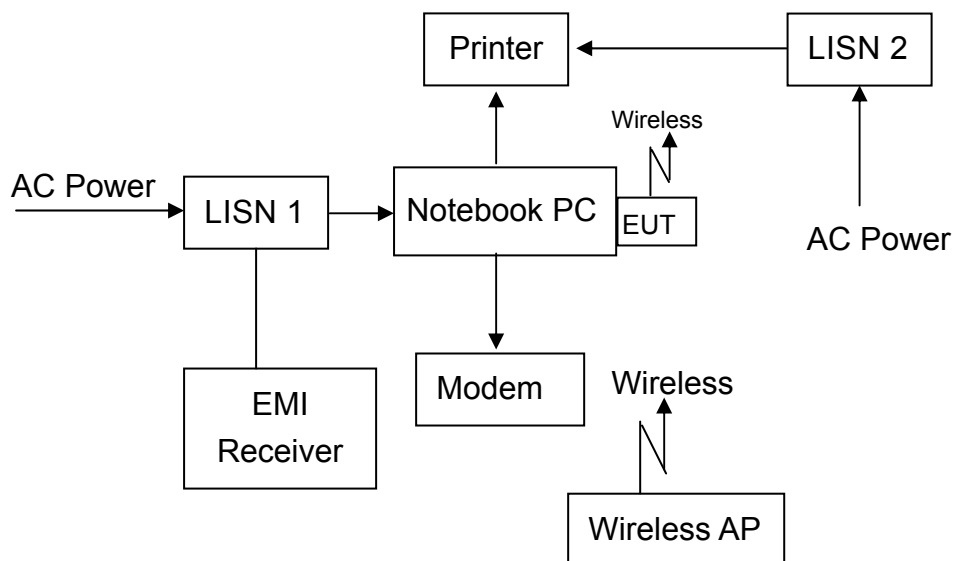
The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

The EUT configuration please refer to the “Conducted set-up photo.pdf”.

### E2. Test Diagram:



**E3. Emission Limit:**

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

\*Decreases with the logarithm of the frequency.



## Appendix F: Test Equipment List

Equipment	Brand	Model No.
EMI Test Receiver	Rohde & Schwarz	ESCS 30
Spectrum Analyzer	Rohde & Schwarz	FSP 30
Spectrum Analyzer	Rohde & Schwarz	FSEK 30
Signal Generator	Rohde & Schwarz	SMR27
Horn Antenna	SCHWARZBECK	BBHA 9120 D
Horn Antenna	SCHWARZBECK	BBHA 9170
Bilog Antenna	SCHWARZBECK	VULB 9168
Pre-Amplifier	MITEQ	919981
Pre-Amplifier	MITEQ	828825
Controller	HDGmbH	CM 100
Antenna Tower	HDGmbH	MA 2400
LISN	Rohde & Schwarz	ESH3-Z5
Wideband Peak Power Meter/ Sensor	Anritsu	ML2497A/ MA2491A
Temperature Humidity Test Chamber	Juror	TR-4010

- Note: 1. The above equipments are within the valid calibration period.  
 2. The test antennas (receiving antenna) are calibration per 3 years.

### Measurement Uncertainty:

Measurement uncertainty was calculated in accordance with NAMAS NIS 81.

Parameter	Uncertainty
Radiated Emission	±4.98 dB
Conducted Emission	±2.6 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.